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DEPLETION OF THE PISMO CLAM IN CALIFORNIA.

By WILLIAM C. HERRINGTON.

Contribution No. 57 from the State Fisheries Laboratory.

On certain sections of the California coast the Pismo clam beds support a fishery of considerable magnitude. During 1925, commercial diggers shipped more than 323,000 pounds of these clams from the Pismo-Oceano and Morro beaches. The fishery is, however, of much greater importance as a source of recreation and food supply to thousands of tourists and auto campers, as well to the local inhabitants of the region. During favorable low tides in the summer months of recent years, hundreds and sometimes thousands of automobiles were to be seen parked on the long sandy beaches at Pismo, Oceano, and

Morro, while their occupants were engaged in digging this esteemed mollusk. In former years the Pismo clam was found in abundance on most of the open sandy beaches of California from Santa Cruz southward. Due to unrestricted digging in the early years, the beaches were rapidly depleted, especially near the areas of densest population, until at present the clams are found, in any abundance, only on the Morro and Pismo-Oceano beaches in San Luis Obispo County.

An investigation of the life history and growth of the Pismo clam was begun by F. W. Weymouth in 1919. The results of his work were published in 1923 in Fish Bulletin No. 7 of the California Fish and Game Commission. Since 1923 members of the staff of the State Fisheries Laboratory have utilized the results obtained by Weymouth, in making an annual census of the clam population in the beaches of San Luis Obispo County. The purpose of the work has been to obtain material for a further study of the Pismo clam and to observe the effect of restrictions of size and bag limit in preserving its abundance.

The highly localized life of the clam in the intertidal zone of easily accessible beaches has provided an excellent opportunity for a quantitative study of the effects of dominant year classes, successful spawning seasons, and overfishing, on the abundance of a species. Any information on such questions is of value because of its possible application to the life history study of less accessible animals.

This article is written to bring to the attention of those interested in the future abundance of the clams, a brief description of the depletion in the fishery which has occurred since the first census of the beaches was made in 1919. A more detailed explanation of methods, data, and calculations will be published at a later date.

Oceano beach has, in recent years, furnished the greatest abundance of Pismo clams on the California coast, and is also the only beach for which we have complete records from 1919 to the present. For the foregoing reasons it has been selected as the location of the present investigation. Work done on the other beaches during the last three years bears out, in all the essentials, the results obtained at Oceano.

In order to study the fluctuations in the abundance of the clams, several cross-sections of the beach were made each year. The sections were of a standard width and made at the same location on succeeding years. All of the clams were taken from the sections, then counted, measured, and their ages read. Comparison of the data obtained from corresponding sections on subsequent years shows the fluctuations in the abundance and size of the clams in such a section. As these sections were made at representative locations on the beach, their fluctuations in abundance give a measure of the fluctuations in the population of the entire beach.

Tables 1 and 2 give the results obtained from the cross-sections made at Oceano during the years 1919-1925. Table 1 gives the total number of clams taken from the cross-section each year and the year classes from which they came. Table 2 gives the same data, but with the number of each year class reduced to per cent of the total number of clams from the section for the respective years. Examination of the table shows that the greater part of the clam population from 1919-1924 was formed by the 1919 class. This is graphically shown in figure 23. The solid line represents the number of clams of all ages taken

from the Oceano section for each year since 1919. The dotted line shows the number of clams of the 1919 class taken each year from the section. If the area beneath the solid line is considered as a representative sample of the entire beach population for the years represented, then the area beneath the dotted line gives the proportion the 1919 class formed of the total and the cross hatched area gives the proportion of all other classes. This graph shows to what extent the 1919 class has dominated the clam population in the beach since 1919, and how the destruction of this class must necessarily cause a great depletion of the total population.

TABLE 1.

Number of Pismo clams of each year class obtained from the Oceano cross-sections since 1918.
The sections were 16cm. wide.

Date	Before 1918	1918	1919	1920	1921	1922	1923	1924	1925	Total
September 11, 1919.....	0	16 ±	704 ±							720
November 23, 1920.....	0	4	490	1						495
July 23, 1921.....	0	42	418	2	0					462
August 25, 1922.....	0	31	465	13	12	3				524
October 24, 1923.....	2	11	317	20	6	29	1			386
November 25, 1924.....	0	6	169	5	11	31	7	65		294
October 30, 1925.....	0	0	5	1	2	4	3	54	5	74

TABLE 2.

The figures from Table 1 in percentages.

Date	Before 1918	1918	1919	1920	1921	1922	1923	1924	1925	Total
September 11, 1919.....	0	2	98							100
November 23, 1920.....	0	1	99	0						100
July 23, 1921.....	0	9	91	0	0					100
August 25, 1922.....	0	6	89	2	2	1				100
October 24, 1923.....	1	3	82	5	2	7	0			100
November 25, 1924.....	0	2	58	2	4	10	2	22		100
October 30, 1925.....	0	0	7	2	3	5	4	72	7	100

The dotted line in figure 23, showing the decreasing number of clams of the 1919 year class in succeeding years, forms the mortality curve of the class. The heavy mortality between 1919 and 1920 occurred during the first year of the young clam existence, when they were small and more or less at the mercy of their natural enemies. For the next two years the mortality was very slight. During this time the clams were large enough to be safe from their natural enemies, and yet too small to be dug by man. From 1922 through 1925, the clams of the class were reaching the minimum legal size limit of $4\frac{3}{4}$ inches. Because of the scarcity of larger and older clams, the members of this new class were dug in great numbers by the clambers. The effect of this extensive digging is shown in the curve from 1923 to 1925. About one-third of the total number were taken each year until at the end of 1925, the entire class had been nearly wiped out.

The depletion of the 1919 class, and consequently of the entire fishery, is shown in another manner in figure 24. This graph shows the length frequency curves for the clams from the Oceano cross-sections at the end of 1924 and 1925. In the 1924 curve, the first peak near the

2 cm. length represents the class spawned in 1924, the next two peaks are for the 1923 and 1922 classes, and the great peak about the 11½ cm. length is due largely to the 1919 class, which makes up 58 per cent of the total population and dominates the year groups of 1921 and 1920, as well as all the older groups. The cross-hatched area shows the proportion of clams which were above legal size. The 1925 curve represents the population one year later. The most important change during the year is in the 1919 year class. The members of this group have practically all passed the minimum size limit and due to the heavy fishing, few of them have escaped the diggers. The other year classes have moved along as expected, and as they are below the legal limit, they have suffered little depletion. This is, indeed, a strik-

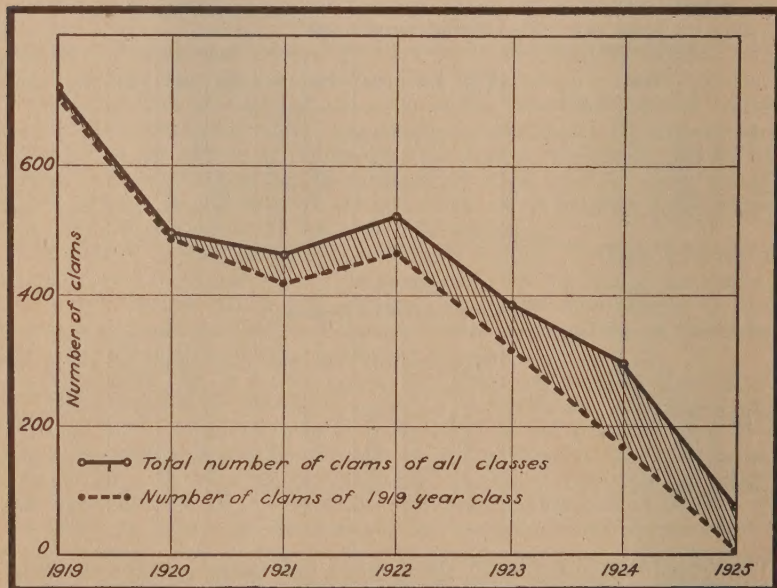


FIG. 23. Graph showing the influence of the dominant year class of 1919 on the abundance of clams at Oceano Beach. The solid line shows the total number of clams taken from the Oceano cross-section each year since 1919. The dashed line shows the number of these which were of the 1919 year class. The values are from Table 1.

ing commentary on the imminent fate of the clams once they have passed the size of legal protection.

The growth of the numerous 1919 class to legal size during 1923, 1924, and 1925, caused a great increase in the available supply of clams in the beach. This increase in the abundance of large clams caused a general belief, among many people interested in the fishery, that the Pismo clam was coming back to the abundance it enjoyed in former years. A glance at figure 24 shows how fallacious is such a belief, for the recent abundance is but a temporary condition caused by the growth of one numerous year class. Due to the heavy fishing, the clams of this class were practically wiped out in three years. Enough of the clams were left at the end of 1925 to furnish a moderate supply

to the few diggers during the winter of 1925-1926, but when the heavy summer fishing is again imposed in 1926, the full effect of the great depletion will be felt.

Now that the supply of large clams is, for the present, nearly exhausted, the question is, What can we expect of the future supply? Any future supply of clams must come directly or indirectly from the younger year classes now in the beach. A knowledge of such classes is, therefore, essential to any intelligent program for the future. The only class now found in any abundance at Pismo or Oceano is that of

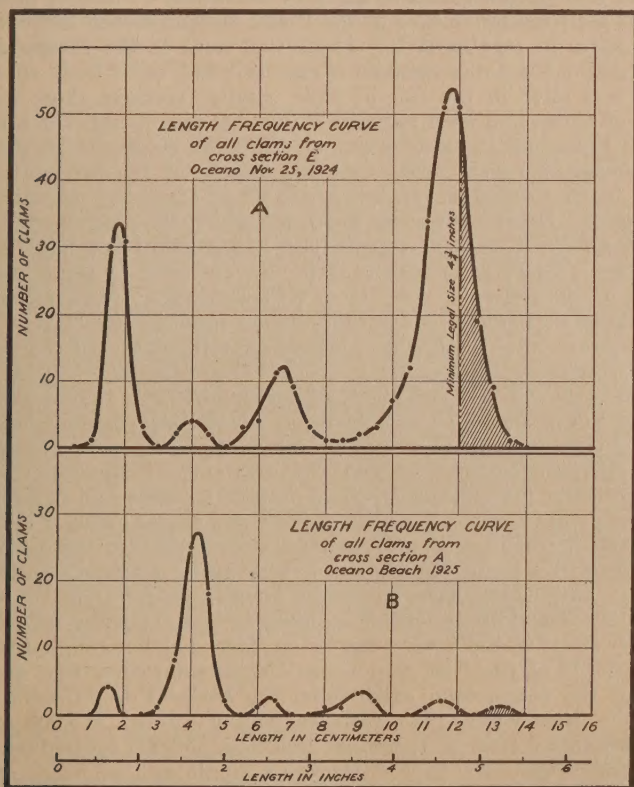


FIG. 24. Length frequency curves for cross-sections at Oceano in 1924 and 1925. In curve A, for 1924, the mode about the 1.8 cm. length represents the 1924 year class. The great mode about the 11.8 cm. length is largely due to the 1919 year class which dominates the year groups of 1921, 1920 and 1918. The shaded area shows the proportion of the clams which have reached legal size. Curve B is for a cross-section made one year later at the same location as A.

1924. This class, although the most abundant since 1919, is but 11 per cent as numerous as was that class at the same age. It can, therefore, be expected under present conditions to have a correspondingly small influence on the future supply. Indeed, the increasing scarcity of the large clams will make the small ones more and more the victims of

thoughtless and unprincipled diggers, and if they are not rigidly protected, it may well be that few of them will ever reach legal size, or mature sufficiently to spawn and thus help perpetuate their race.

If any intelligent program for the preservation of the Pismo clam fishery is to be carried out in the future, it is essential that there be an understanding of the agencies that have caused the present depletion. The data collected since 1919 gives a general idea of the enormous number of clams removed by these agencies. Our cross sections show that at Oceano in the fall of 1922, there were approximately 5,270,000 Pismo clams in a single mile of beach. When it is considered that the productive area of the Pismo-Oceano Beach is from seven to nine miles in length, it is evident that even if the foregoing estimate is high, the total number of clams must have been enormous. Three years later in the fall of 1925, similar sections show that the number of clams had been reduced to 750,000 individuals for a mile of beach; a reduction in three years of 4,520,000 clams, or 86 per cent. The cross-sections were made near the middle of the productive area and can be considered as representative of, at least, the central section of the beach. During the three years for which the data is cited, there occurred no great natural catastrophe which could account for such a mortality. There have been reports now and then of the destruction of clams by the presence of oil from tankers loading at Port San Luis. In the cases reported the destruction has been comparatively slight, and in no case would it begin to account for the observed depletion of the clam beds.

The only agency, of which we have knowledge, that could have produced the great depletion which has taken place, is man, as represented by clam diggers of all kinds. These diggers can be divided into two groups, the commercial and the amateur. Commercial diggers ship practically their entire catch to outside markets and are required to possess a state license. Because of these two checks on their activities, they are comparatively easy to watch and control. On the other hand the amateur digs clams for use or for the fun he derives from the performance, and either uses his catch himself or gives it to friends. There is no record of the extent of his activities, and any calculations as to their effect on the fishery can be considered as but rough estimates.

The records of the Fish and Game Commission show that the total weight of the commercial catch from the entire Pismo-Oceano beach during the three years, 1923-1925 was slightly under 575,000 pounds. This represents a total of somewhat less than 550,000 individual clams. Our cross-sections show that at Oceano a single mile of beach suffered a depletion of 4,520,000 clams during this same period. It, therefore, seems quite evident that the commercial diggers can have been but a minor factor in the depletion of the beach.

The part played by the amateur diggers in the depletion of the Pismo clam fishery is difficult to analyze because of the lack of any statistics on the amateur catch. In order to obtain any conception of this phase of the fishery, we must fall back on the observations of dependable eyewitnesses. At any low tide during the summer of 1925, several hundred machines were parked along the hard, smooth Pismo-Oceano beach, while their occupants were busily engaged in obtaining their limit of clams. On week-ends and holidays this number was increased many times. Mr. Edwards, the fish and game deputy at

Oceano during the summer of 1925, stated that on several occasions during that time he had counted and estimated about 1500 machines parked on the beach, while their drivers and passengers were digging clams. His figures are for the number of machines present at the time his count was made, and do not take into account the diggers who must have been on the beach at other hours during the day or at the low night tides. These estimates were corroborated by residents near the beach and by our own observations. It is impossible to obtain any accurate record of the number of clams taken by such a group, but a general idea of the amount can be arrived at by some rough estimates. If we make the conservative assumption that each machine carried two diggers, then at a time such as observed by Mr. Edwards there would be 3000 diggers on the beach from the automobiles alone. As the clams were

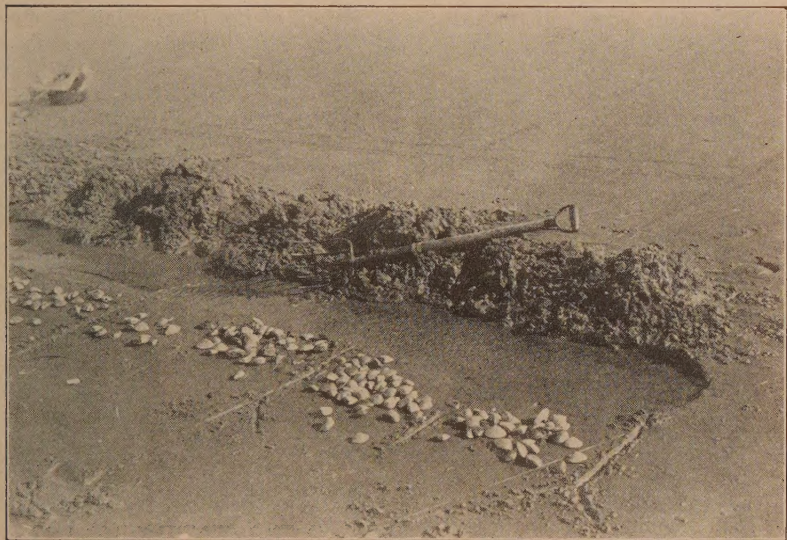


Fig. 25. Pismo clams from Watsonville Beach. The numbers of clambers along beaches where this large clam is to be found has increased to such an extent that the future of this shellfish is threatened.

located well up on the beach at low tide and were very numerous, especially during the early summer, the limit of fifteen clams was easily obtained even by the most inexperienced. Assuming that each digger obtained his limit, the three thousand autoists would obtain a total of 45,000 clams.

Considering the number of times such a group was present during the summer and the number of clams dug by smaller parties during the week, it can readily be seen that the catch secured by autoists, campers, and local diggers might account for the great decrease in the number of clams in the beach since 1922. The great volume of automobile traffic along the coast highway would probably account for a large part of the depletion, as Pismo and Oceano are favorite stop-over points for tourists and campers. These estimates are for the Pismo-Oceano beach only. Morro beach lies off the main traveled road and,

due to its remote location and to the greater abundance of clams at Pismo and Oceano, has been less frequented by both commercial and amateur diggers.

The condition which has made the 1919 class so readily susceptible to the inroads of the unskilled diggers, was the location of the clams well up the beach in the intertidal zone. There appears to have been very little diffusion of the individuals of this class into deeper water where they would have been less readily accessible. A number of trials made at low tide in water from two to five feet deep indicated that the clams at this depth were less abundant late in 1925 than at any time since records have been kept. This condition makes the stripping of the intertidal zone even more alarming as the reserve stock of clams in deep water is small and will have a correspondingly small influence in maintaining the fishery.

This brief survey of the present condition of the Pismo clam beaches in San Luis Obispo County indicates that they are at a very critical stage. Unless drastic measures are taken in the very near future, these beaches will soon be reduced to the same condition that is now found at Long Beach, Anaheim Beach, and other southern California beaches, where this clam was formerly abundant. In considering protective measures, it must be remembered that at present the number of diggers is so great in comparison to the supply of clams left in the beach, that reduction of the bag limit would serve merely to slightly retard the disappearance of the clams. Measures must be devised which will protect the present young year classes until there has been an opportunity for a new breeding stock to be built up. The alternative is the loss of a valuable natural resource, and the waste of the productive possibilities of many acres of beach.

SUGGESTED DATES OF OPEN SEASON ON DEER IN CALIFORNIA.

By JAMES MOFFITT.

The recommendation recently made by the San Joaquin County Game and Fish Protective Association that the laws be changed to provide a uniform opening date, September 1, for the deer season has prompted the writer to set forth the following opinions based on personal experience. Newspaper publicity given the above mentioned resolution indicates that it results from the belief that antlers are in the velvet prior to September 1.

I believe that our present game laws as regards deer hunting are the most sensible of any and very nearly perfect. It seems unfortunate that they should be criticized in what I believe the wrong direction. However, suggestions for change are usually made with the sincerest intentions for the benefit of our deer; and after all the only way we can effect improvement is by recommending changes.

I have hunted for the past five or six years in Sonoma and Mendocino counties, and for at least five years prior to that have made observations on deer in Marin and Sonoma counties and I believe that I am well acquainted with conditions in this section. The deer start shedding the velvet in July, usually about the 15th, and once begun the

process is a speedy one. I have never seen a buck in the velvet after August 1. A five-pointer that I killed near Glen Ellen in Sonoma Valley on this date had a few shreds of dry skin adhering to the base of his antlers. The latest date on which I have seen a buck in complete velvet in this section is July 25. While a few backward individuals may retain the velvet a short time after the first of August, I am certain that by far the greater proportion lose it before this date. Reports from hunters in the region south of San Francisco Bay, Mount Hamilton and Livermore sections, indicate that this also holds good there. Therefore, it will be seen that there is little danger of bucks being in the velvet on the opening of the season, August 1 in this section, whatever the objections to this may be.

The closing date in this region is now September 14. Permitting shooting after this date would be absolutely wrong as the coast deer

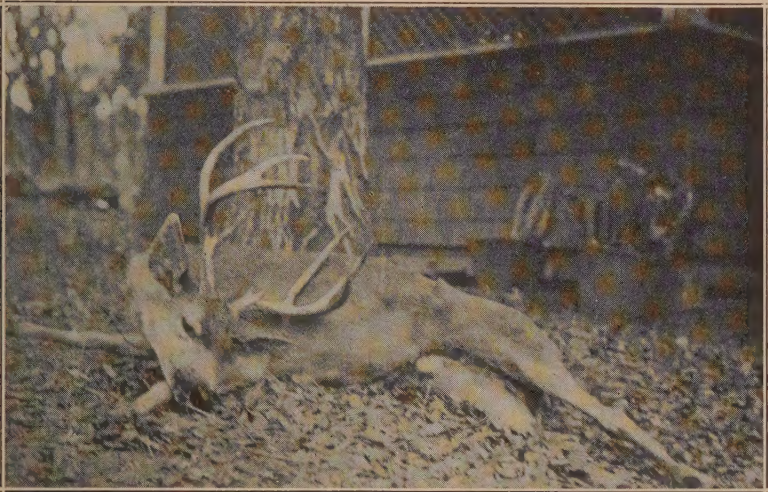


FIG. 26. Columbian black-tailed deer killed near Glen Ellen, Sonoma County, California, by the author, August 1, 1921. Note hard, fully matured condition of antlers entirely free of velvet. Photograph by James Moffitt.

start "running" very early. In Mendocino County, about twenty-five miles northwest of Cloverdale on the headwaters of the Garcia River, where I have done considerable hunting, the bucks' necks start swelling about September 1, and by September 15 are considerably enlarged, showing that the rutting season is at hand. Due to their greater activity at this time and also to the fact that they forsake the brush for the wooded sections for the acorns which fall at that time, much better hunting is afforded during the last two weeks of the season than during the previous four. It would be against all principles to hunt after this time when bucks are running with does, and any change in the season in this section should be towards an earlier closing date, if necessary. However, the present open season seems about ideal, as deer appear to be increasing yearly and there is no apparent need for any change or reduction in bag limit.

In the Sierras in the Tahoe region and in Alpine County, where I have also hunted deer for the past twelve years, they appear to be about six weeks behind those above mentioned. I have never seen a deer out of the velvet, or even commencing to shed it on September 1, and I believe that September 15 is about the average date when shedding is completed. If there is objection to hunting them when in the velvet, the season should not open until September 15, that is, two weeks later than at present. This, I believe, would be a good plan, not for the reason that antlers are still in the velvet, but because it would save many deer from other than the more enthusiastic hunters. Most of the summer vacationists who incidentally go deer hunting are out of the mountains by mid-September, while regular hunters could go out after this date just as well, when they would find the mountains more attractive through the absence of a crowd of novices. Also two holidays,



FIG. 27. Rocky Mountain mule deer killed near Lake Tahoe, Placer County, California, by H. C. Moffitt, September 1, 1921. Note that the horns are in complete velvet, round pointed, and far from the mature condition. Photograph by E. G. Schmiedell.

Labor and Admission days, would be avoided, with their attendant tribe of nimrods.

Up to five or six years ago I noticed a marked increase in the number of deer in the Sierras, and since that time they seem to be holding their own in numbers. (This probably is because of the wise extermination of mountain lions, and the establishment of game refuges for the preservation of a breeding stock.) As hunting increases, as it is bound to do, it may become necessary to impose further restrictions here. In my mind the first move should be to shorten the season to four weeks, commencing two weeks later than it does now and closing as at present on October 15. This, as above indicated, should effect

a considerable saving. Under no circumstances should the season be prolonged after mid-October, for in the first place there are rarely any deer in the higher mountains on that date, as they suddenly migrate west at the first snowstorm, usually about October 10, and secondly because some are about to start "running" by this date, although the majority probably does not do so until nearly a month later. If further restrictions are necessary, the bag limit should be reduced to one buck per season. In the case of large animals, such as are found in the Sierras, this should be sufficient for anyone.

The shortening of the season to four weeks and the protection of forked-horns in Modoc County as enacted at the last legislature, was an excellent move. Rather than working a hardship on hunters in this section, it is actually a blessing, as it is here that hunters go for big heads. By protecting forked-horns there will be more large deer available, for after the first season, it is evident there will be just as many deer of legal age to kill, less the small percentage that die of natural causes during their third year, as in previous years. It is to be regretted that the law was not also applied to Siskiyou or at least to the eastern portion of that county, as mule deer range there as abundantly as in Modoc County. Last season, many hunters secured forked-horns there the first two weeks of September. It is possible that the "no forked-horn" law could be applied with advantage to all the Sierra Nevada country, where deer do not attain full size until the fourth or fifth year. It is excellent legislation both from the conservation standpoint and the extra caution it imposes on the hunter. Needless to say, it will not work in the coast counties, as here most old bucks revert to forked-horns (known as "Pacific" bucks), and bucks with more than two points on a side are scarce.

The present season in Game District 1½, comprising Humboldt, Del Norte and Siskiyou counties, with the exception of the change suggested above for the latter county, seems to be about the right thing, since the deer here are later in shedding the velvet, running, etc., than in the counties to the south. These functions probably occur here at about the same time as in the Sierras, therefore the two areas may be considered together as regards opening and closing dates. Due to the type of country and number of hunters, however, there does not seem to be the danger of diminishment here that may exist in sections of the Sierras.

As I have had no experience in Districts 4, 4½, or 4¾, comprising the southeastern portion of the state, or in Monterey, San Luis Obispo, Santa Barbara, or Ventura counties, the southern portion of District 3, I am not in a position to discuss the status of the deer there.

In conclusion it may be inferred that I believe the game laws, as applied to deer in California at the present time, pretty thoroughly cover the situation, and that sufficient evidence to necessitate any drastic changes at present does not seem to exist, except possibly in Siskiyou County as already indicated.

A marking system, the use of tags, such as has been advocated, is a good thing and one which we should all work for. Let us hope that some action to secure the same will be taken at the next legislature.

FISH AND GAME COMMISSION ADOPTS NEW POLICY OF FISH PLANTING.

By B. D. MARK GREENE.

A recent survey of the apportionment of trout for distribution throughout the state revealed the inadequacy of the present system. Thus it appears that the highly competent and efficient work of Mr. Shebley and his staff is dissipated by the subsequent unsatisfactory handling of the fish.

After the trout leave the fish cars, the responsibility of Mr. Shebley, superintendent Department of Fishculture, really ceases and much of the commission's efforts and money spent in propagation of trout is virtually wasted through an inefficient and unpardonable method of distribution. This is not Mr. Shebley's fault. He is in no wise to blame. It is the fault of the commission.

The whole trout planting system is based upon applications from individuals and organizations, requesting fish, and in most cases designating only generally where they are to be planted. The commission has depended entirely on outsiders to choose localities to be planted and to do the planting.

To a certain extent the sportsmen have a just cause of complaint, but yet again they, themselves, are to blame, for it is their incessant and unceasing demands for fish and more fish and the political and other pressure which they have brought upon our commission that has led to the present conditions.

Recently the writer checked over some 500 applications for fish. The reason for so doing was that Mr. Shebley did not wish, alone, to take the responsibility of not shipping Loch Leven and brown trout to regions which have received them in the past but which, in accordance with our new policy, are not to receive them in the future. In other words, many waters which are strictly rainbow waters have in the past been stocked with Loch Leven and brown trout, and Mr. Shebley did not wish, personally, to take the responsibility of cutting down the requested allotments. Time and time again, in checking over individual applications, instances were found where last year brown and Loch Leven trout were sent to an applicant, who this year will be furnished with rainbow or brook trout only. In some instances, Mr. Shebley had penciled a note on the application to the effect that the lower waters of the region proposed to be stocked were adaptable to Loch Leven and brown trout, leaving it to me to say whether or not they should be sent this year. My question to Mr. Shebley would, in each instance, be "Can we rely upon the applicant to put the brown and Loch Leven in the lower reaches and the rainbow in the upper reaches?" and, in practically every instance, he would reply that there could be no guarantee of such planting, and that we would run the risk of having Loch Leven and brown trout again planted in rainbow waters. Consequently, I have been ruthless in cutting the applications, and from one end of this state to the other there is going to be a clamor from malcontents who do not receive the amount and kind of fry they requested.

Furthermore, many of these people are not only willing, but actually request, that they be given Loch Leven and brown trout, whereas, to

be consistent, we must restrict these varieties to the levels below the 3500-foot contour, or to localities where they can not pass into rainbow streams.

In checking over the applications one finds that the applicants seem to feel that they have a "God-given" right to a certain quota of fish. In most instances they only generalize as to what streams they will plant. In other words, they feel that they have a property right in a certain amount of trout fry, and that they can plant them when and where they choose.

Our entire planting system is fundamentally and entirely erroneous. It is as much the commission's duty to see that proper plants are made as it is to rear healthy fry. Surely, if our new game farm were to hand out pheasants and quail to any person who asked for them and were to let them plant the birds when and where they wished, it would be a failure. It is our duty to see that proper localities are selected, which will harbor and protect the birds and yield the best results. This year, every pheasant delivered from the game farm will be planted by our own men, and we will take the full responsibility for the planting. This should have been the case with our trout planting.

From personal contact with our deputies and sportsmen's organizations throughout the state it is apparent that only too often the following conditions occur during the planting season:

For many months an organization of enthusiastic sportsmen will meet frequently to discuss planting problems for their streams; they make up their minds as to what streams shall be planted and the number of fry necessary, and then file their application with the Sacramento office of the Fish and Game Commission. This application is fully considered along with hundreds of others and an allotment is made, often, of necessity, in quantities less than requested. Advance notice of the arrival of the fish car is given to the applicant—and then all of the carefully arranged plans seem to miscarry. The men who had signified their willingness to be on hand to receive the fish and care for them are detained by urgent personal matters—the truck that had been promised fails to arrive—a haphazard, untrained crew meets the fish car, and, becoming weary of their labors after going a portion of the distance, they dump the fish into the first available stream. No equalization of water temperature is attempted; proper aerating of the water is neglected, and the fish are often dead or dying long before they reach their proper destination. This, I am reliably informed, is not an exaggerated picture.

Furthermore, each of the parties planting fish is required to make a report to the Fish and Game Commission specifying what fish are planted and where, and the condition of the plant. These reports are, in many instances, not furnished; or, if furnished, are not accurate.

Any accident to the fish is blamed upon the commission which, unfortunately, has no possible method of checking up to find where the blame should properly be placed.

This criticism is, perhaps, a little too general. There are many individuals, and some organizations, that cooperate with us fully in planting, notably the Fresno organization under the leadership of Mr. Grimes. Their planting can not be bettered, but these men and organizations are in the minority.

. Hereafter the commission will receive no applications for trout fry. It will immediately proceed to make a thorough, state-wide investigation and survey to determine what species of fish are now in our streams and lakes, their approximate abundance, and the species that should be planted in the future. Prior to the opening of the next planting season, a decision will be made as to the streams and lakes that will be planted—the proper number of fry will be allocated to each and then, in each county or locality, certain individuals will be selected who can cooperate with our local patrol to insure that the fry intended for a certain stream or lake are actually planted therein.

Furthermore, adequate resting stations with troughs are to be established throughout the state in suitable locations, and the fish left there until adequate and proper transportation can be arranged. All planting must be done under the supervision of commission employees who will be trained in the work, and thoroughly coached by Mr. Shebley prior to the time their new duties begin.

Arrangements are now being made for a large map, to be placed in Mr. Shebley's office, and used as a key to all of our streams and lakes, so that we may visualize our planting problems. This map, by appropriate colorings based on the survey now under way, will show the needs of future plantings.

A BIRD HOUSE COLONY.

By GRACE M. FRENCH.

The appearance some years ago of a pair of bluebirds in our yard at Carlton, Oregon, prompted us to put up a bird house for them. It was a fearful and wonderful structure viewed in the light of later experience and knowledge of the birds; it was made from a small box a foot long and ten inches high. Two doors were cut on opposite sides at the level of the floor. The roof was gabled, and the house then painted a bright red color.

The male bluebird of this pair was immediately attracted to the house, but the female would have nothing to do with it, and chose to nest in another house that was nailed to the trunk of an oak tree. There she raised three broods, fifteen in all, that summer. The male bluebird took the two first fledged broods to sleep in the red house each night and in that way kept other birds from nesting therein. That fall (1915) we had a band of seventeen bluebirds in the yard, and for the last few years bluebirds have occupied six of the houses. They are by far the most quarrelsome of any bird nesting in the yard. During the first two weeks of February there is a constant state of excitement among them and by Valentine's day they are mated and looking over the houses. As they stay here all winter they have the first choice and the swallows and wrens have to take what is left. There are, however, over fifty bird houses on the two acres near our home and birds invariably find nesting sites to their taste.

The birds become so accustomed to persons moving about the yard that they pay little or no attention to them. For example, I once stood within ten feet of a northern violet-green swallow that was disputing a piece of nesting material with a bluebird. Curiosity seems to be one of the leading traits of the bluebird, for they are constantly

peeking into the doors of the other bird houses. I have never known the bluebirds to kill any bird or destroy a nest, but they keep the other tenants of the bird houses continually on the defensive during the nesting season.

During very cold winter weather the bluebirds leave the yard and resort to the fir woods, where one hears them calling from the tops of the tall trees. Here I have watched them foraging on the bark of trees for insects. As soon as the weather moderates they come back to the hill on which our home is built.

Sometimes, in winter, as many as a dozen bluebirds will sleep under the same roof, but they do not necessarily choose the same house each night. Unlike the bluebird, in this respect, the slender-billed nuthatch will go to the same house every night for months, unless, perchance, the bluebirds appropriate it, but if the nuthatch can once get inside, he can fend off any number of bluebirds. Despite this seeming regularity, these nuthatches are whimsical, for they will frequently desert a site that has been their home for two or more seasons.

The Oregon chickadee prefers more natural nesting sites, so we sawed out sections of hollow limbs and put them up in suitable places. Since then we have had one and sometimes several pairs of these attractive and useful birds living in the orchard. The chickadees also sleep in the houses in winter.

A male Gairdner woodpecker has appeared in the yard every evening for many months. He gives his call, then ducks into his chosen house, part of a hollow limb of an old apple tree set on top of the clothes line pole.

We have six larger houses which have been occupied by flickers. Occasionally a pair of sparrow hawks will leave the woods and raise their young in one of these houses. The Lewis woodpeckers have never nested in the bird houses, but nearly every winter one or more of them come to the yard to feed on the bountiful supply of acorns to be found on the large oak trees on the hill, and to sleep in the houses.

The red squirrels store acorns in the bird houses and often make their nests there in winter. In search for these stores of acorns the stellar jays go from house to house and pull out the old nests, thus cleaning them for the birds. Once, when I wanted to show the right type of bird house to a group of school children, I took down a house that had been nailed on a large oak tree and found that it not only had a nest in it, but that the squirrel was at home. He had stuffed the door full of moss, and he set up a noisy chatter at the unexpected house moving.

If a pair of swallows seem disturbed at something near their old home it is wise to take the house down to investigate, for wasps occasionally make their paper nests in a bird house or a noisy bumblebee may use one of these cozy places to set up housekeeping.

In some localities the house wren seems to have gained a bad reputation, but I have nothing but good to tell of him. In my large colony of bird houses, these wrens have attended strictly to their own affairs. As many as six house wrens have nested on the acre near the house, and watching from the window, I have never yet observed them to interfere with the other birds; nor do the swallows or bluebirds bother the wrens or show any concern when they nest near them, despite the fact that some of the houses are not more than ten feet apart. The

house wrens take all sorts of nooks and any size of house for a nest. One pair used a large barrel, that had previously served a flicker, and another a pasteboard box that had held feed in the weather vane feeding station. Though I have found house wren nests in all sorts of places, they are usually to be found in sunny or exposed sites. For instance, one nest was behind a piece of loose bark on a large oak tree far out in the pasture. However, one associates the house wren with the dwellings of man and that is where one most often finds them.

The Seattle wren is more retiring in its habits, and its nest is generally found in among the trees in shady places. Catering to this preference we made ten wren houses out of three-pound tin cans, with inset covers. With a can opener I cut a hole in the center of the cover, and drove a nail through the back of the can into a small board. We then put these houses up on the trunks of trees along the hedgerow, and down in the pasture. Every house was subsequently occupied and all went well for a few seasons until one day a group of small boys tore down all these improvised houses. Fortunately there were no small birds in the nests at the time. Since then all bird houses have been put in the yard where I could protect them. When the cans were occupied, it was a simple matter to remove the cover and examine the nests without disturbing the birds to any extent. These tin can houses were satisfactory, for they were put up in very shady places, but whenever possible, it is better to use wooden structures. I have often found these Seattle wrens nesting in empty cans that have been left in the barn, between sticks of wood piled in the pasture, in holes in the ash trees down in the swale, or in piles of brush on the hillside near the fir woods. While this bird does use a bird house, it is not essentially a door-yard bird as is the house wren. It is most often found near the woods.

While the birds I have mentioned are all attractive in their different ways it is the swallows that are the distinctive feature of my colony of house nesting birds. One of the most devoted, attractive and by far the noisiest bird around a bird house is the male tree swallow. He talks to his mate and peeks in the door to see her many times through every hour of the day. He begins his chatter at the first sign of dawn and with four and sometimes more of these birds nesting near the house the yard is a noisy place on summer mornings. We have never banded any of the birds but who could doubt that it was one of our old birds that had returned when one March first on hearing the familiar chatter I saw a tree swallow high in the air, then thrilled to see that this first migrant was headed straight for the yard and then—best of all—it flew directly to the very house that a pair of tree swallows had occupied the previous summer.

It is fortunate for us that our farm is off the main highway, for otherwise we would be bothered by many curious people who would be attracted by the numerous bird houses and the swarms of birds circling over head. In the yard there is a high aerial, 120 feet long, of four wires, swung between two masts, one of which is 101 feet high and the other 60 feet. These long, high wires and the guy wires furnish resting places for the swallows, and they are often weighted down with the young tree, violet-green and cliff swallows that nest on the barn. Some seasons there are as many as twenty pairs of violet-green swallows nesting on the two acres near the house. They are not at all particular

as to the site or size of the house for their nest. They even use the tin can wren houses or little nooks around the buildings, or nest under shingles, or other sheltered places. They seem to want the company of others of their species. The swallows are attractive for their beauty and they are a great economic asset on a farm in controlling the flies and other insects.

The house that we have adopted as being both practical and good looking is of one compartment, ten by eight inches, with gable roof eight inches to the peak, with the entrance, one and one-half inches in diameter, near the top. The ends are made of inch lumber and the rest of the house of one-quarter inch lumber. Most of the houses are nailed to boards and these boards nailed to fence posts, thus raising the bird houses about eight feet from the ground. The cats never bother a house put up in this way.

An Englishman, who claimed that the English sparrow is a beneficial bird and wanted to see the ban lifted from this foreign invader, wrote to me and asked if I had not observed these birds eating aphides on rose bushes. I could verify this all right, but wrote him that we immediately shot every English sparrow that appeared in the yard, for I have studied their behavior on the neighboring farms. One old orchard, that once boasted a large colony of native birds, now has nothing but these sparrows, for they were permitted to usurp all the nesting places. It has never been necessary to shoot more than two or three English sparrows any year, for every bird in the yard bands together to fight them if they dare to try and enter any of the numerous houses.

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"The nation, and indeed the world, have need for a thorough appraisal and understanding of natural resources, both in wild life and in the riches of the earth."
—Calvin Coolidge.

AN IMPORTANT COURT DECISION.

On May 17 the District Court of Appeal, First Appellate District of San Francisco, decided in favor of the Fish and Game Commission an original writ of *habeas corpus* brought by one James A. Makings in an attempt to declare unconstitutional that portion of the Penal Code which prohibits the exportation of crabs from Humboldt County. The matter was argued freely and in the opinion delivered by the appellate court this section of the law was declared constitutional and the court handed down the general doctrine that the legislature has the right to enact special legislation for individual fish and game districts. This is a most important decision outlining the way for future legislation.

N. B. SCOFIELD ATTENDS MEETING OF INTERNATIONAL FISHERIES COMMISSION.

On June 21, 22, 23, N. B. Scofield attended the first formal meeting of the International Fisheries Commission—United States and Mexico. The meeting was held in Los Angeles and the four members were present. It was decided to secure offices for the commission headquarters at San Pedro, and the Mexican and American members each chose a secretary to carry on the detail work of the commission at these offices. Miss Geraldine Conner, secretary of the Department of Commercial Fisheries, California Fish and Game Commission, was chosen as secretary by the American members.

The Fisheries treaty provides that fishing boats operating off the coast of California or the coast of Lower California must conform to the laws of the countries adjoining these waters, and also to the regulations which might subsequently be adopted. From every ton of fish caught by American boats in Mexican waters, the Mexican government now derives a \$30 fish tax. At the request of the American members, the commission has recommended that the Mexican government reduce this tax from \$30 to \$20 per ton, and there is every assurance that this will be done by the end of August.

The treaty further provides that correct data on the "catch" of American boats in Mexican waters be furnished the California authorities. This is essential for conservation purposes.

The cannery, fish dealers and fishermen of southern California will welcome a commission of this kind, for it offers an adequate channel for dealings with the Mexican government.

The United States government has appropriated \$30,000 for the work of the commission for the 1926-1927 fiscal year, while the Mexican government has made an appropriation of 158,000 pesos. Under the terms of the treaty, this money will be largely used to facilitate the conservation work of the respective fishing authorities.

The commission recognizes the value of the fisheries program being carried on by the California Fish and Game Commission, and desires to cooperate with it and gain its full support. It also desires that its research workers use, as far as is practicable, the State Laboratory as their headquarters. This cooperation will extend the work of the California Commission to species in immediate need of investigation, which have thus far been neglected owing to lack of funds. Among these are: spiny lobster, barracuda, sea bass, and California halibut.

GRUNION NEEDS PROTECTION.

Those who have read the two fish bulletins which deal with the life history of the grunion or "little smelt" will need no additional stimulus to stir their interest in this remarkable small food fish of the southern California coast. Thousands of residents in southern counties know of this small fish that is found on the beaches in the wash of the waves during the periods just after the full of the moon and the dark of the moon in the

spring, and many make monthly pilgrimages to the beaches to collect the fish for food. Whether additional publicity given this interesting fish, due to the discovery of its extraordinary spawning habits, has increased the number of persons visiting the beaches, we do not know. However, those who have been making a study of the fish find either it or its eggs increasingly difficult to secure during the regular spawning seasons. This has been particularly noticeable this spring and conservationists are becoming worried as to the future of the grunion. One of the fundamental laws of conservation is that breeding animals shall be left undisturbed. The fact that people gather by the thousands at Long Beach and other beaches and collect the small spawning grunion as they run onto the beach to lay their eggs means that the breeding grounds are being continuously raided. Evidence is at hand that depletion is taking place and that protection during part of the spawning period is necessary in order to allow the fish a chance to reproduce itself. From the standpoint of a zoological curiosity alone a fish that has tide controlled spawning habits, and a marine fish that deposits its eggs on the land rather than the sea, is worth conserving. As a secondary reason, it is highly prized as a food fish. The problem is made the more difficult because of the rapidly increasing population of southern California. These same beaches that once supported enormous numbers of clams have been denuded of shell fish and it appears that the next natural resource to go will be the grunion unless protection is forthcoming.

TWO NEW FISH HATCHERIES.

Plans have been made for the construction of two new fish hatcheries to be constructed by the Pacific Gas and Electric Company under direction of the California Fish and Game Commission. A party of commission officials joined those of the public utilities corporation during the latter part of May in a trip to Pit River, Fall River and Hat Creek sections of Shasta County for the purpose of locating sites for the hatcheries. The more important of these hatcheries will be built upon a bench, five acres in extent, bordering Lake Britton and a short distance below Burney Falls. This site lies about six miles from the village of Burney, one-half mile from Burney Creek State Park and about the same distance

from the main highway leading to the head of Lake Britton, where is located the intake of Pit River Power Plant No. 3 of the Pacific Gas and Electric Company. The hatchery will contain 100 troughs and be as large as most of the units in the standard hatcheries of the state. For the present this hatchery will be used solely for the propagation of trout.

The second site selected is at Hagan's Flats, near where the proposed Pit River Project No. 4 will stand when constructed. This hatchery will be a temporary structure designed to serve until after erection of the new No. 4 Power House. Between 50 and 60 troughs will be established in it and only chinook salmon will be propagated. Following completion of the new power house and the road leading thereto, the temporary hatchery will be converted into an egg-taking station for salmon, and the hatching will be done in greatly enlarged quarters at the Lake Britton site.

Mr. Downing agreed, upon the part of the Pacific Gas and Electric Company, to begin construction of the necessary hatchery buildings and cottages for commission employees in time for the annual take of chinook salmon eggs this fall. Proper racks and traps necessary to the egg take will be installed and everything made ready against the coming of the spawning season.

These hatcheries are required by law due to the erection of obstructions preventing the passage of chinook salmon and other fish peculiar to the waters of Pit River, Hat Creek, Fall River and their tributaries from the lower reaches to the old-time spawning beds, above the dams. These include the rainbow trout, chinook salmon, suckers, riffle pike, and several other species which belong to the minnow family.

Salmon, upon being hatched, will be released only in those reaches of the river below the power sites, to permit the young fish going to sea. The various forms of other fish taken and hatched will be released in water deemed most suitable therefor.

ECONOMIC VALUE OF THE MEXICAN FREE-TAILED BAT.

In California the Mexican free-tailed bat (*Tadarida mexicana*) occurs abundantly throughout the Upper and Lower Sonoran zones, from the southern border of the state northward at least to Marysville Buttes, Sutter County. Recently

four publications* have appeared dealing with the economic status of this bat.

Mr. Campbell's book is in part devoted to an attempt to show that the species is effective in controlling malaria by destroying *Anopheles*, the mosquito which other than man is the only host of the malaria parasite. The book also adduces evidence to show that bats can be successfully attracted to artificial roosts, thereby controlling malaria in a given region and at the same time producing a valuable return in guano, which is in demand as fertilizer. The sweeping assertions, the unscientific method of employing the facts and the inconsistencies within the book itself are seemingly sufficient to convince a trained biologist that the work is not to be relied upon; indeed statements in absolute contradiction of established facts frequently appear. The bats may eat mosquitoes, but numerous examinations of the feces from Dr. Campbell's bat roost by trained entomologists (see Storer) fail to reveal any mosquito remains. This proves that, at the time, mosquitoes were not a part of the food of the bats whose feces were examined, and to quote Mr. Goldman " * * * suggest that he (Dr. Campbell) may be mistaken in regard to the extent to which *Tadarida* feeds upon *Anopheles*, and in the general role of this bat in malaria control." Mr. Goldman also says, "While many bats may be useful insectivorous animals, the conclusions reached in regard to their value in the control of malaria based on such evidence are very unconvincing to those informed. The author has demonstrated that a bat roost with commercial possibilities as a fertilizer producer may be constructed under especially favorable conditions, but there can be no justification for his assumption that what has been done at Mitchell Lake can be done anywhere in the world, ignoring the distribution of species and environmental conditions in general. The public should be warned

that the construction of expensive bat roosts even for guano production, should be undertaken only on the basis of expert knowledge of bats in their relation to local conditions. The unqualified recommendation (pp. 157-158) that every community, large and small, should have one or more of these bat roosts, which may cost from \$2,500 to \$3,500, would, if followed, mean in most cases a useless expenditure of funds and certain disappointment.

"The novelty and plausibility of the bat roost idea as presented are calculated to appeal to the imagination. Unfortunately, the book may be accepted at its face value by many who are unfamiliar with the fundamental biological principles involved and who can ill afford the loss of money invested in bat roosts, most of which, except in localities in certain regions only that are favorable for guano production, are sure to remain permanently empty."

If sufficient is learned of the habits of the bat and the conditions necessary for its existence to insure its colonizing in artificial roosts, such roosts should be of interest to citizens within certain local areas in California.

One of Dr. Campbell's bat roosts is apparently a paying proposition. However, according to Dr. Nelson, not one of the other seven bat roosts, distributed from Florida to Texas, have been taken up as an abode by bats. In short, although bats are eminently useful in controlling the numbers of many, mainly night flying, insects, and do provide an income in guano where they collect in large numbers, they have not as yet been proven to be an effective agent in control of malaria and have not been induced to enter man-made structures designed for them to an extent that warrants the erection of such structures, for the purpose of collecting guano.

In addition to the Mexican free-tailed bat there are no less than thirty other kinds of bats in California. In the warmer parts of the state it is believed by naturalists who have studied the problem that the number of bats is equal to the number of insectivorous birds. Despite their large numbers, bats are not well known to the average person; this is largely due to their crepuscular habits. All the bats in California are wholly insectivorous. As pointed out by Grinnell (Teacher's Bulletin, California Fish and Game Commission, No. 6, April 1916):

"Enough is known to make it certain that vast quantities of night-flying insects

*Campbell, Charles A. R.

1925. Bats, mosquitoes and dollars. The Stratford Company, Boston, Mass. pp. i-viii, 1-262, with unnumbered plates.

Goldman, E. A.

1926. Review of Campbell, Charles A. R. bats, mosquitoes and dollars. Journal of Mammalogy, 7 (2) pp. 136-138.

Nelson, Edward W.

1926. Bats in relation to the production of guano and the destruction of insects. United States Department of Agriculture, Department Bulletin No. 1395, pp. 1-11, figs. 1-4.

Storer, Tracy I.

1926. Bats, bat towers and mosquitoes. Journal Mammalogy, 7 (2) pp. 85-90, 1 plate.

are destroyed by the bats every twenty-four hours. It is further obvious that the kinds of insects thus affected by the bats are not at all the same as those combated by the diurnal birds. Thus it can be said that the role played by bats in their relation to insect repression is complementary to that played by birds in the daytime.

"By the farmer of intelligence bats should be looked upon not as ugly 'vermin,' but as desirable citizens. They do not harbor bed-bugs, but make way with destructive insect pests. They work the night shift."—E. R. Hall.

CONDITIONS AFFECTING MIGRATING WILD FOWL.

There are apparently two great adverse factors directly menacing the perpetuation of our migratory wild fowl, and these overshadow all others. One is the drainage of water areas by man, and the other is a succession of years of scanty rainfall, and its effect on a great area in the West, as indicated by the disappearance there of many ponds and small lakes.

In efforts to conserve the big-game animals of the country it has been found that man has occupied most of their former wintering grounds, and the great conservation problem has been one of sufficient winter forage, the summer forage being usually abundant. In the case of migratory wild fowl, there is arising a like problem—that of maintaining sufficient water areas where the birds may feed during their migration and in winter, but there must be retained undisturbed sufficient breeding grounds, the basis of all wild-fowl production.

The danger to the perpetuation of the stock of wild fowl is so great and so imminent from the causes mentioned that there is the most vital need for all conservationists and lovers of wild life to sink petty differences of opinion as to details and to unite in constructive work to insure the future of our migratory game birds.—*Migratory Wild Fowl and Present Conditions Affecting Their Abundance*, by Edward W. Nelson, Special Rpt. United States Dept. of Agriculture, Bureau of Biological Survey, Mar., 1926.

DESTRUCTION OF PREDATORY BIRDS.

A number of prominent ornithologists the country over are becoming greatly disturbed at the continued slaughter of predatory birds. The list of nearly a dozen names includes that of Witmer

Stone, director of the Philadelphia Academy of Natural Sciences; W. DeW. Miller, associate curator of birds, American Museum of Natural History; Louis A. Fuertes, artist and ornithologist; Ernest Thompson Seton, artist and naturalist, and Gerald Thayer, artist and ornithologist. Included in this group are also the names of several nature writers, as, for instance, Samuel Scoville, Jr., and Thornton W. Burgess. This campaign for education is also being promoted by the National Audubon Societies.

These men have issued an interesting, illustrated bulletin, entitled "Save These Birds." The men concerned have doubtless been driven to their present stand as a result of a notable decrease in various species. The leaflet has sufficient bearing on this much discussed problem to warrant its publication here. In order that every Californian may understand the present conditions in this state, it should be noted that the species of non-game birds, which have been most notably decreased in the past ten years, are white-tailed kite, osprey, prairie falcon, and red-bellied hawk—every one of them a so-called predatory bird. These same birds have long been protected by law, so the decrease is not due to a lack of legal protection but to the reputation given these birds by the gunner and the subsequent disregard of the law. The duck hawk, Cooper hawk, sharp-shinned hawk and horned owl are blacklisted by state law.

Contents of this bulletin follow:

SAVE THESE BIRDS.

By early writers the birds of prey were considered the highest type of bird life. Their strength and speed, their splendid flight and majestic mien go far toward justifying this opinion.

The eagle has been from time immemorial the symbol of power and might, and "the way of an eagle in the air" is still one of the unsolved mysteries. Even our familiar hawks, as the red-tail, are masters of the air, and John Burroughs, in one of his essays, has eulogized their aerial prowess.

The red-shouldered hawk, soaring and screaming over the winter meadows is, says C. C. Abbot, one of the few bits of primitive wildness left us.

The well known naturalist, W. H. Hudson, writes thus of the peregrine falcon or duck hawk: "This famed bird is of a handsome appearance, not swallow-like as is the kite, nor so massive as the eagle; but nature in fashioning it has observed the golden mean, and the result is a being so well-balanced in all its parts and so admirably adapted for speed, strength, and endurance, that to many minds it

has seemed the most perfect among winged creatures."

The owl, Minerva's bird, has for centuries been the symbol of wisdom. The barred owl is strangely human in voice and aspect, and the hooting of the great horned owl is one of the most solemn and impressive of all wild sounds.

These splendid birds have indeed fallen on evil days. They are now regarded as "vermin." Sportsmen demand their extermination.

The bald eagle, the emblem of our country, has a price on his head. The noble peregrine, which in the palmy days of falconry could be possessed by no one of lower rank than an earl, is now legitimate prey for anyone with a gun.

Other birds, too, the herons, the kingfisher and even the redheaded woodpecker, have come under the ban. Their beauty of form and color count for nothing. We have no more picturesque bird than the great blue heron. Either in flight or at rest its presence adds immeasurably to the scenic value of a lake or marsh, yet because he takes a small pay for his services he must be destroyed!

The damage done by crows has been greatly exaggerated and used as an excuse for their wholesale slaughter. One man reports the capture and killing of over 500 at one time by a new method of trapping. The crow is a conspicuous and attractive element in the landscape, particularly in the dreary months of winter. Who would not miss the sight or "the black'ning trains of crows to their repose?"

Is it not high time that the nature lovers of this country asserted their right to a share in its wild life? Are we not justified in demanding that our rights, and those of our successors, to the enjoyment of these marvelous creatures be recognized?

Many of these species are already seriously diminished in numbers. Of late years the killing of hawks with guns and traps has been carried on in a wholesale manner. Hundreds of migrating hawks are killed in a single day; for example, 900 on one September day in southern New Jersey. Men who have been killing migrating hawks in the northeastern states for years past admit that for the last three or four seasons the flights have been conspicuously smaller than in former years.

About game farms constant warfare is waged on all species. Hundreds of traps are set in all directions for as much as two miles from the farm. The cruel and indiscriminate pole trap captures not only all kinds of hawks and owls, most of them useful species, but also many songbirds. Farmers are making a regular practice of trapping hawks during the winter, and nearly all of those captured are red-tails, red-shoulders, and rough-legs, all beneficial species. State game officials who ought to know better shut their eyes to the true nature of these

birds, and the old excuse that "a hawk is a hawk" serves to condemn them all.

As sportsmen increase in numbers, and sporting journals multiply, the propaganda against the birds of prey grows rapidly. New methods of slaughter are devised and advertised, while prizes and bounties stimulate destruction.

Fortunately we do not have to rest our case entirely on the scientific and esthetic value of these birds, weighty as these reasons are for the lover of nature.

The majority of the 50 species of hawks and owls of this country have been proven by the United States government to be mainly or wholly beneficial. Some 2700 individuals were examined by the Biological Survey, and the chief food of most species was found to be injurious rodents and insects.

More than half of the 41 species examined are so nearly guiltless that, of 1293 individuals belonging to 24 species, only four contained poultry and but three had eaten game birds.

The periodic plagues of mice in Great Britain are a matter of history. In the year 1580 and again at intervals during the next three centuries hordes of mice appeared in one or another part of England. They were invariably followed by great flights of owls, which entirely destroyed them. In 1892 great damage was done by a similar outbreak in the south of Scotland and the preponderance of opinion among the farmers, as quoted in an official report, traced the scourge to the scarcity of hawks, owls, weasels and similar rodent destroyers.

Most of us have no objection to legitimate hunting when game is abundant and the supply is not depleted. But the present practice of sportsmen who seek to remedy scarcity of game, brought about through excessive hunting, by endeavoring to exterminate scores of beautiful and valuable species is indefensible.

In Great Britain, as a result of the "pheasant worship" so deplored by Hudson, most of the native hawks have been nearly or quite extirpated. Our graceful marsh hawk, our soaring buzzard hawks, our splendid duck hawk or peregrine, will be but memories if the slaughter goes on unchecked. The bald eagle is already so rare that the sight of one is an event. The innocent long-eared owl and the valuable rough-legged hawk are but a remnant of their former numbers.

The more useful species of hawks and owls are legally protected in certain states, but it is to be feared that the protection is largely nominal. In other states even these beneficial species, and the great blue heron also, are outlawed.

Unfortunately no raptorial birds are protected by the federal law, although certain species are both more migratory and more insectivorous than many of the species covered by this statute, and their value should be legally recognized.

Let our bird protection be sane and reasonable. Even those species of hawks

and owls that kill many small birds are not enemies of the song birds, but on the contrary are of benefit to the species, killing as they do, mainly the weaklings. The number of the smaller species can not possibly increase beyond certain limits, and only the surplus is taken by predatory animals. Our abuse of these interesting wild creatures as "murderers" and "convicted felons" is creditable neither to our intelligence nor to our love of nature.

The obvious duty of societies organized for the protection of birds is to work for the preservation of those species that are in special need of defense.

The fight for our song birds has been fought and won. Gulls and terns, once nearly exterminated for millinery purposes, are once more abundant. Sanctuaries for herons, egrets, and ibises in the south are saving these birds from extermination.

It is now the hawks, the owls, the great blue heron, and other birds against which campaigns are being waged, that must be the object of active protective work.

Bird-protection organizations, supported by the nature-loving public, are the logical force to combat the widespread ignorance and prejudice regarding the birds of prey.

The economic importance of most of our commoner species of hawks and owls is shown by the following records. All except the "pellet" statistics are from Fisher's "Hawks and Owls of the United States in Their Relation to Agriculture."

Broad-winged hawk, 65 specimens. Not one contained poultry or game; only two had small birds. The rest contained mice and other small mammals, reptiles, batrachians, insects and other invertebrates.

Red-shouldered hawk, 320 specimens. Two contained poultry and one had game. The rest held mice, reptiles, batrachians, insects, etc.

Rough-legged hawk, 49 specimens. Forty held mice, most of them having from three to eight mice apiece. Not one contained birds or game of any kind.

Sparrow hawks, 320 specimens. One had a game bird, none poultry; 215 held insects; 101 mice and other small mammals. (29 empty.)

Barn owl, 39 individuals. One held a pigeon, none had game; 24 contained rats, mice or other small mammals. A large lot of cast "pellets" of this owl collected at Washington, D. C., contained 3100 skulls, of which 3004 were mammals (1987 field mice, 656 house mice, and 210 brown rats).

Long-eared owl, 107 individuals. One contained a game bird; 84 held mice (15 empty). The contents of a number of lots of long-eared owl "pellets" gathered in various parts of northern New Jersey was as follows: Mice and rats, 9852; other small mammals, 697; birds, 296. Among the mammals there was but one cottontail rabbit, a young individual, and

not a single gray squirrel. There were no game birds, and no poultry, the great majority of the birds being small sparrows of various kinds.

Short-eared owl, 101 individuals. None contained poultry or game: 77 held mice.

Screech owl, 255 individuals. One had eaten a pigeon; none contained game. About 100 had small mammals, chiefly mice, and 100 held insects.

GOLDEN EAGLE EXTERMINATION IN ENGLAND.

In the British Isles the control of certain predatory animals has reached, and in the case of several species has exceeded, the states of "control" reached in western North America. From the Thirty-fifth Annual Report of the Royal Society for the Protection of Birds we learn that within the last few years the white-tailed eagle has entirely disappeared throughout many regions. Likewise, the osprey has gone. Now, due largely to poisons put out by game keepers, the golden eagle is threatened and its numbers have been so far reduced that its survival is doubtful. In fact this species has been extirpated in England and Ireland and remains only in certain small portions of the British Isles.

It is on account of just such results as these in other areas that the California Fish and Game Commission has temporarily refused to issue permits for the use of poison in game refuges, other than for the useful methods of control of ground squirrels, until the results of an investigation to be undertaken soon by Mr. Joseph Dixon in the interests of both the U. S. Biological Survey and the National Fur Association are available. This investigation is expected to determine, among other things, the effects of poisons on wild life other than that for which the poisons were intended, particularly the effects on fur-bearing mammals.—E. R. H.

RUFFED GROUSE DISEASE.

For several years past the sportsmen of the eastern United States have worried over the decrease in ruffed grouse and the evidences of disease which have been found. During the past year a committee, appointed to investigate the disease, has employed Doctor Alfred O. Gross of the Roosevelt Wild Life Experiment Station of the New York State College of Forestry at Syracuse, and his preliminary report has recently been published. An examination of numerous specimens has shown the occurrence of three hitherto unreported diseases of ruffed grouse in the wild state, namely,

tuberculosis, pulmonary mycosis, and a third disease as yet not identified. Heretofore, it has been thought that a certain stomach worm infesting grouse was largely responsible for the fluctuation or periodical decrease in the numbers of birds. It now appears that the new-found diseases may play a more important role than was at first suspected and thus complicate the problem. Of 17 specimens of diseased grouse examined, six were infested with the stomach worm, three gave positive evidence of tuberculosis, two of pulmonary mycosis. As a result of his studies, the author draws attention to the surprising number of diseases in the small number of specimens examined and emphasizes the importance of making autopsies of the entire bird. Examinations of large numbers of specimens extending over a period of several years must be completed before generalizations securing conservation of the ruffed grouse can be made.

SAN BENITO COUNTY RECEIVES MEXICAN BOB WHITE QUAIL.

Fifty-two Mexican bob white quail, purchased from breeders in Mississippi by the San Benito County Fish and Game Protective Association, arrived February 28 with loss of twelve birds. They were held until acclimated and then released along the San Benito River, near Hollister. Ranchers have promised to assist in protecting them. Thirty were released on the Carr Ranch, and ten on Santa Ana Creek. A second shipment of seventeen to replace the dead birds of the first shipment arrived later, and after being held two weeks were liberated on the Carr Ranch.

Later news is to the effect that several pairs mated and are nesting. As evidence, eggs from a deserted nest were sent to the Fish and Game Commission in San Francisco.

COMMITTEE TO STUDY GAME CONDITIONS.

A study committee has been formed by the Conservation Department of the California Development Association to make a survey of the fish and game problems of the state. Members of this committee are:

Chairman, Albert Lindley, Stockton; vice chairmen, Earl R. Kauffman and Henry W. Keller; secretary, Charles G. Dunwoody; A. E. Dalton, Dr. E. F. Auble, Henry Garrison, James N. Proctor, V. A. Hart, S. N. Barnhart, Harry Ridgway, Thomas J. West, Sherwood Green, Manly Harris, J. Sub Johnson,

Judge L. C. McCloud, Dr. Barton W. Evermann.

This committee will be assisted, when necessary, by an advisory committee of other members, and the results of these investigations will be used to guide the future policy as regards fish and game resources.

EXCEEDING BAG LIMITS.

A listening ear among sportsmen groups in California will quickly pick up an undercurrent of criticism against activities on gun club grounds. At first one might think that these criticisms were the result of jealousies and came entirely from outsiders who were affected by the poorer shooting afforded on open grounds. However, analysis will show that in reality many members of gun clubs deplore the fact that bag limits are exceeded frequently and that the policy of piecing out bag limits by the work of the "keeper" is a common one. Members of gun clubs usually set themselves up as being the best type of sportsman in the state, and we wonder whether they ever think of the example they set to the would-be sportsman by allowing violations of the gun laws on their club grounds.

Another common undercurrent of feeling is the unfounded rumor that game wardens carefully avoid convictions on club grounds and spend their time patrolling roadways surrounding the grounds purposely to stand in with the gun club members. Of course when attempts are made to get proof on any such statement, it is not forthcoming.

Unfortunately, such accusations as stated above only apply in a few instances for more and more on club grounds the members are held to strict rules, and furthermore as a rule, there are only two hunting days a week against the seven days that are often utilized by the free hunter. Nevertheless, there should be less basis for such criticism and every club should have rules which come definitely within the law and should see that they are enforced by their own officers without securing the help of the nearest game warden.

HUMANE CAPTURE OF FUR-BEARERS.

A new organization, sponsored by the American Humane Association, is planning a nation-wide campaign to bring about more humane methods in the capture of fur-bearing animals. The headquarters of the new organization will probably be in the national capital, and

the movement is designed to bring about reforms in the present methods of taking furs, and in educating the public along constructive and economic lines.

COMMON SENSE VS. SENTIMENTALISM IN RELATION TO SPORTS.

Dreamers are beginning to envision a new golden age when firearms and fishing tackle will be known only as relics of barbarism, and when the perfected superman shall have abolished the struggle for existence, and all organisms from the microbe to mammal may be indefinitely sustained on a synthetic elixir of life.

No doubt, by that time the superman can solve the problem of the congestion of living things that will then exist in a better way than that chosen by the Creator.

Humanity has been crawfishing towards a higher state of civilization with amazing rapidity these thousands of years, but the goal of an ideal and consistent existence is a long, long way up the road yet. At the present time our strivings for an Utopian condition of society are filled with contradictions and inconsistencies. Perhaps this but emphasizes the fact that we are on our way. However, it might be just as well to strive for consistency in our progress and move forward with understanding and with some degree of recognition of the stage we have reached in our long journey.

The sensibilities of some persons seem periodically to undergo a severe trial. At one season the anglers are found over the country lugging around their allegedly torturous paraphernalia; at another season the hunters roam the fields and hills with their guns, also allegedly torturous. And at such times there is always someone lamenting the cruelty of hunting and fishing.

The animals of the wild places appeal to the sentiment of people. And it is right that they should. However, sentimentality is entirely a different matter.

Many wax indignant over the killing of wild life by the hunter or fisherman, yet the processes of our slaughter houses and our own back-yard butcherings do not trouble them in the least. When it comes time to kill Johnny's pet rabbit for the Sunday dinner it is only a matter to be handled with diplomacy and with as much dispatch as possible. Of course, Johnny may think it cruel, and, strange as it may seem to those who pretend to see cruelty in the shooting of a wild rabbit, the sportsman himself is likely to agree with Johnny. The true sports-

man can not help but feel that the animal is being betrayed; it has learned to trust its human friends, only to meet death at the hands that have caressed it. Yet those who condemn hunting and fishing condone this betrayal as being the God-given right of mankind.

While we may betray trusting domestic animals without protest, we can not pursue the wild birds of the air or the beasts of the fields or the fish of the streams where the animals pursued have a chance to outwit or escape the pursuer without bringing down upon our heads a shower of protests that the killing is cruel. The killing that is done by the hunter or fisherman is the most merciful of all, and the fairest of all.

A sportsman may be cruel, but most sportsmen are not, and certainly all deserving the name are not.

To the wild animal whose life is one long struggle against its enemies, and whose life almost without exception comes to a violent end in the course of nature, the pursuit by the hunter is but an incident of its existence. In facing this danger the animal maintains what freedom it possesses or can possess. The domestic animal has no freedom and finds its death not at the hands of an enemy who may be escaped but at the hands of a friend who can not be escaped.

Does it render a humane service to the deer to allow it to run unmolested by rifle ball only to fall a prey to the mountain lion—which also, under the plan of the hyper-idealist, would be permitted to multiply? If the deer could choose, would it accept death from fang and claw, an always present danger, in preference to death by the swifter and more merciful bullet during a few days in the year?

Wild life always has existed under the law of the survival of the fittest, and it will continue to do so for a long time to come. And man will continue to eat meat. These facts will remain facts for many a generation. Why not admit it and act accordingly?

This is not a plea for the pensioning of domestic animals, but rather for a sensible view of hunting and fishing, and for a realization that it is not cruelty to perpetuate hunting and fishing as sports. The sport is not in the killing—all sportsmen will agree to that. The killing is incidental and serves exactly the same purpose as the killing of domestic animals—the providing of food.

Hunting and fishing form the more humane method of obtaining meat for the table, although the demands of mankind

for animal food makes the slaughter house and the back-yard butchering necessary. It is more sportsman-like and more humane to take the gun or fishing rod and go out into the open in pursuit of game than to take the ax or cudgel and go out to the poultry yard or rabbit hutches.

More attention should be given to the propagation of wild life and its conservation, if for no other reason than that for which domestic animals are propagated and maintained—the stocking of the larder. The wild game would make it possible occasionally to supply the family with delicacies without paying high tribute to the butcher, which would be a genuine satisfaction.

But a more important reason for the maintenance of wild life lies in the benefits that come as by-products of the hunt and the fishing trip. There is more blessing for the human being in bringing down a wily old mallard with a gun that must be handled with skill to turn the trick, and all that such a performance implies and demands than in decapitating a pet chicken with an ax. And the bird would prefer the former death to the latter.

Long life to hunting and fishing!—
Forest and Stream, September, 1925.

RECREATIONAL LANDS.

Dr. J. N. Lowe, in an article entitled "Land Utilization" in the March number of *Development Bureau News*, Upper Peninsula, Michigan, presents much food for thought in his discussion of the relative amount of land that should be set aside for recreational purposes. This includes game refuges. The amount is tentatively set at 7 per cent of a given area, in this case, Michigan. The following quotation indicates that California stands second in relative amount of land set aside for such purposes:

"California comes second with 1,900,000, or 1.9 per cent, without the federal reserves, but if these are included, 3 per cent of its lands are in game refuges. Wisconsin has 19,335 acres, or about .19 per cent, and Pennsylvania has 76,317 acres or .26 per cent."

State.	Acres in Game Refuges.	Pct.
Minnesota -----	2,843,000	5.04
California -----	1,900,000	1.90
Michigan -----	272,559.53	.74
Pennsylvania -----	76,317.70	.26
Wisconsin -----	69,335	.19
Vermont -----	10,883	.18

NEW BOTANICAL GARDEN.

Mrs. Dorinda Blakely-Bliss has donated fifteen acres of land in Mission Canyon, Santa Barbara, for the establishment of the Blakely Botanical Garden. It is a wonderful thing to have on display plants and trees from the world over. Likewise it is a wonderful thing when, through the establishment of a zoological park, people are able to study live animals rather than stuffed specimens in a museum. Fortunately, in spite of the fact that there is only one outstanding zoological garden, that at San Diego, there is an increasing interest in animal life in California. An incipient zoo is to be found in Oakland's new park in Redwood Canyon.

BOY SCOUTS MAKE GAME CASE.

On July 9, 1924, the following boy scouts: C. A. Lamb, scout master from Orange County; Leon Atwood, Jr., of San Bernardino; Wayburn Wolf of Redlands, Wiley Searing of Redlands, Henry Cross of Redlands and Roy Cross of Redlands were camping at Dollar Lake. While they were scouting around they found three fresh deer hides. Noting the tracks of some pack animals that had left the spot, they followed the tracks over the trail from Dollar Lake to Barton Flats, where the pack animals took the old cattle thieves' trail, not shown on the government map. They then went to the forest ranger and reported their find to him. He got in touch with the proprietor of Seven Oaks Resort, who in turn telephoned Mr. W. C. Malone, Deputy Fish and Game Commissioner, at 1 p.m. Mr. Malone immediately went to the ranger's station, viewed the hides and had a conversation with the scout master and a number of the boys. The boys were all worked up about this flagrant violation of the game law, as they had a right to be, since it was out of season and in the heart of Fish and Game Refuge No. 4-A.

After securing a search warrant the authorities followed the trail of the pack animals to the Mountain Home Resort Lodge, where Charlie Martin, owner of the ranch and former chief of police of San Bernardino, was placed under arrest. He afterwards pleaded guilty to "violation of the game law—venison in possession out of season in the game refuge," and was fined.

**NEW TEACHERS' BULLETIN ON FISH
AND GAME LAWS.**

Bryant, Harold C. Fish and Game Laws and the Reasons for Them. State of California, Fish and Game Commission, Teachers' Bulletin, No. 8, pp. 1-7, April 24, 1926.

In preparing this bulletin Dr. Bryant has supplied to teachers a much needed resume of the fish and game laws of the State of California. Indeed, the need of a concise authoritative statement of this kind to place in the hands of students has of late repeatedly been expressed by teachers. Although designed for purposes of elementary education, adults, interested in laws designed to conserve wild life, will find much that is helpful in it.

The subject is dealt with under the following heads: History of Fish and

Game legislation, Penalties, Law Enforcement, California Laws, Seasons, Open and Closed, Bag Limits, Size Limits, Methods, Nonsale, Pollution, Game Refuges, Game Farming, Federal Migratory Bird Treaty Act and Game Law Abstracts.

In the questionnaire at the end are sixteen questions which bring the more important provisions and principles underlying them, into relief. This bulletin will, it is believed, be extremely helpful to any teacher directing a course of study in natural history or general biology.

Copies of this bulletin may be obtained free of charge from the Bureau of Education and Research, California Fish and Game Commission, Museum of Vertebrate Zoology, Berkeley, California.—E. Raymond Hall.

FACTS OF CURRENT INTEREST.

At the end of May the Department of Fishculture of the California Fish and Game Commission had over thirty-two and one-half million small trout and eggs on hand.



During the year ending December 31, 1925, 224,085 California angling licenses were issued. During the past year 226,421 hunting licenses were sold.



The influx of tourists to Yosemite this year is greater than ever before. The instruction given in natural history and conservation, by means of lectures, field trips, and motion pictures meets with the most hearty response. Similar opportunities are now being offered at California State Redwood Park.



The approaching dry season is one in which the moisture content of the duff on the forest floor is low and danger of forest fires is increased. Forest fires destroy game; they destroy the beauty and value of the region; they destroy seeds, seedlings and plant life; kill enormous quantities of growing timber; consume the leaf litter and humus on the forest floor; make deserts of thousands of acres of land; kill live stock, and destroy fences, buildings, crops and valuable property; sometimes they take human lives; they despoil your hunting grounds.



In addition to the \$2,484,706 that California secures from the post office appropriation bill of February, 1925, for the construction of roads, the United States Forest Service has received \$1,089,386 for the fiscal year beginning July 1, 1926. Of the latter amount \$681,222 will be expended in the construction of major forest highways and \$408,164 on minor roads and trails.

COMMISSION ACTIVITIES.

CABINET MEETINGS IMPROVE COOPERATION.

Various heads of departments have met regularly at cabinet meetings and a number of definite rules have been approved which will greatly improve the cooperation between various departments, and in some instances will prevent duplication of work. Through these meetings department heads will be able to make the work under their supervision fit in with the general policy of the commission.

COMMISSION IN TOUCH WITH CONSERVATION CLUBS.

The commissioners and employees have continued to keep in touch with the numerous fish and game protective associations which are springing up in all parts of the state. On June 9 the commission was represented at an important meeting at Visalia of various conservation clubs of the south end of San Joaquin Valley. All of the associations are strongly in favor of real conservation and are looking with favor upon the present program of the Fish and Game Commission.

Department of Fishculture.

NEW POLICY OF FISH PLANTING.

The California Fish and Game Commission has placed itself on record as scrapping its former haphazard policy of fish planting. Beginning next year, the commission will plant trout only after a thorough survey has been made to determine the species best suited to particular waters, and the numbers required. The planting will then be done by reliable sportsmen's organizations, or sportsmen residing in the vicinity, with the assistance, and under the supervision, of an employee of the commission, trained in the art of fish planting.

The commission's decision is based upon an exhaustive report recently prepared by B. D. Marx Greene, executive officer, following an extended conference with W. H. Shebley, chief of the Fishculture Department. Mr. Greene declares that while many of the volunteer planting crews in California are doing their work in a splendid manner, the whole

principle of the present planting system is wrong, and that it is as much the duty of the commission to properly plant streams and lakes as to rear healthy fish. His report commends many California sportsmen's clubs and individuals for splendid, though thankless, work in the past. The main reasons for, and some discussions of, this new policy are to be found in Mr. Greene's article, page 128 of this number.

This entire program has been adopted by the commission, and while it is too late to initiate it for this season's planting, the survey will begin at once with a view to putting it into effect next season.

NEW HATCHERIES PLANNED.

On May 21, Commissioner Zellerbach and other officials chose a site for the new trout hatchery on Burney Creek to be constructed by the Pacific Gas and Electric Company. A tentative agreement as to the details of construction is given on page 135 of this number.

Plans are being prepared for the new trout hatchery to be erected at Yosemite. Aquaria for exhibiting game fish will be one of the features of the new hatchery.

HATCHERY NOTES.

Extensive repairs and improvements have been underway at the Mount Shasta Hatchery. Several ponds have been relined with planking and new settling tanks installed.

The take of rainbow eggs at the Klamath auxiliary stations was not as large as in former years owing to the water being too cold and too low, so that the spawning fish did not enter the tributary streams. Many fish spawned in the river rather than in the tributary streams. Snowfall and rainfall have been below normal in the Klamath region.

Last season one million steelhead trout eggs were collected from June Lake, Mono County. The spawning fish were seined from shallow water. This is a new source of supply.

The total distribution of salmon from the Fort Seward Hatchery for the past season was 1,998,000. The grand total of eggs handled at the Mount Shasta Hatchery during the month of April was 20,748,000.

Department of Commercial Fisheries.

SALMON AND STRIPED BASS INVESTIGATIONS.

Dr. J. O. Snyder, who has been directing these investigations, left during June to take charge of the marine biological laboratory of the U. S. Bureau of Fisheries at Woods Hole, Massachusetts. He will return in September to assist in the registration of zoology students at Stanford and then take active charge of the salmon and trout investigations on Klamath River. The university has given him leave of absence during the fall quarter for this work. As Dr. Snyder is acting head of the Department of Zoology at the university, we should consider ourselves fortunate to get so much of his time. As an illustration of the importance with which this work of Dr. Snyder's is regarded, the president of the university in his last annual report mentions the fishery work of Dr. Snyder and his field assistant, E. C. Scofield, for the Fish and Game Commission, as one of the principal research activities of the Department of Zoology. During Dr. Snyder's absence, the field work will be carried on by E. C. Scofield with G. H. Clark assisting.

The striped bass investigations being carried on by E. C. Scofield have progressed very satisfactorily. Due to the strike of river fishermen during the spawning run of bass, it was impossible to get the desired data on the age and size at which striped bass mature, but enough data was gathered through the efforts of Charles Bouton, captain of our patrol boat "Quinnat," and by hiring special fishermen, to make it reasonably certain that at least a majority of the bass mature in their fourth year and at a size which escapes through the nets of minimum sized mesh of five and one-half inches.

The work of tagging troll-caught salmon continued to be a disappointment in June due to the failure of commercial trollers to catch the fish in sufficient numbers. This work is being carried on by Paul Bonnot and one assistant at Eureka, where the best catches of salmon have been made.

A number of complaints and two petitions have been received by the Commercial Fisheries Department telling of the depredations of seals and sea lions in southern California. They ask that the

protection given these mammals in southern California be withdrawn so that they may be killed. Part of the present agitation was started as a result of propaganda by a man formerly employed in sea lion killing by the state of Oregon. More information as to the food of sea lions is needed, and the Commercial Fisheries Department plans to detail a man to gather additional facts as to the abundance, distribution and food of these animals.

The Special Libraries Association of Southern California held its March meeting in the library of the California State Fisheries Laboratory. After the business had been disposed of, Mr. W. L. Scofield, now in charge of the laboratory, gave a resume of the scientific work being done by the California Fish and Game Commission, in which the librarians expressed considerable interest. Their organization is composed of university, medical, business, and museum librarians, many of whom have an opportunity to spread conservation propaganda among the sections of the reading public which they serve.—R. M. Thompson.

During June the tuna season began in southern California, and data will be collected on albacore during the next three months by Mr. Van Deventer under the direction of the Fisheries Laboratory, in connection with the albacore conservation program which has now been carried on for several years.

Bureau of Screens and Ladders.

A new Bureau of Screens and Ladders has been created with Mr. John Spencer in charge. For the past six years, Mr. Spencer has been with the California Railroad Commission in the hydraulic division. Mr. Spencer was first lieutenant in the Engineering Corps of the army during the war and for nine years previous to that time was superintendent of engineering on irrigation and domestic water systems, and in particular had charge of the water division of the Pacific Gas and Electric Company centering out of Auburn. Mr. Spencer brings to the commission a vast experience and a most pleasing personality. Work is already under way and much is to be hoped from this department in the near future.

A joint investigation, covering a period of thirty days, will be made by a committee consisting of representatives of the

U. S. Bureau of Fisheries, of a power company, Associated Sportsmen's Clubs, and of the Fish and Game Commission to determine whether trout of a non-migratory type are drawn into the turbines of a power plant. Racks and traps will be installed below the power plant at Hat River No. 1 and a watch kept for trout that might pass through the conduit. This investigation should give data as to the necessity of screening the inlets to the turbines of power plants.

Bureau of Pollution.

To clean up the many instances of pollution in streams and coastal waters seemed an insurmountable task until undertaken systematically by a separate bureau. A better understanding of the magnitude of the work is in evidence when the various sources of pollution are named: distilleries, gas plants, lumber mills, mines, oil refineries, slaughter houses, and tanneries. However, systematic endeavor is bringing worth while results, for every monthly report shows numerous inspections made and many actual clean-ups reported. Those cases which needed action have received quick trial and speedy settlement. In most instances, however, corporations have been found ready to cooperate with the commission in what they understand is necessary for the welfare of fish and fisheries in the state.

Companies in the Ventura oil field have agreed to place new flumes and pipe lines together with new sumps to prevent further pollution of the Ventura River.

Bureau of Finance and Accounts

A heavy sale of angling licenses was reported for May by the Bureau of Finance and Accounts. The total angling license sales for the year ending December 31, 1925, was \$232,501. Of this amount \$218,224 accrued from licenses sold to citizens of California, \$4,221 from licenses sold to nonresidents, and \$10,056 from licenses to aliens. One hundred and two licenses were issued to veterans of the Civil War.

Bureau of Education and Research.

Dr. H. C. Bryant reports large crowds

at the Yosemite National Park this year. His lectures have been well attended. In fact, he and his assistants have all the work that they can handle.

Classes are taken to the various points of interest and are shown the local fauna and flora. The interest shown by all is very gratifying.

Bureau of Publicity.

The Bureau of Publicity is issuing regularly to all important newspapers in the state, stories which tend to inform the public of the activities of the commission and teach respect for fish and game laws. Newspapers are using the news items without cutting.

Bureau of Game Farms.

Weather conditions at the Game Farm during the month of June were ideal for bird propagation. The growth and development of birds was normal in every way. As it was found impossible to cultivate the ground and seed it, dry pens were resorted to. It was necessary to purchase lettuce in large quantities to feed both young and old birds. In another year, the grain feed for the birds will be produced in the pens. The domestic hens utilized in hatching the eggs will be held over and will furnish the eggs necessary for food. Besides kale and rape as green feed and cover, buckwheat will be planted in the pens next year. Experiments will also be made with proso, a feed said to furnish the main diet of game birds in Russia and said to be ideal for use at game farms.

During the early fall breeding birds will be chosen and the surplus stock planted on ground that has first been inspected and found suitable.

The breeding stock at the Yountville Game Farm has been producing eggs in the expected number. By the first of June 5500 pheasant eggs had been laid, 1809 birds hatched and placed in rearing pens, while 2081 eggs were still incubating. A number of eggs were infertile and some young birds were lost as a result of the large hens necessarily used in hatching. Later incubators were used with good success, since the loss from being "killed in the nest" was much less among the newly hatched birds.

A splendid stock of Mongolian pheasants, furnished by the state of Washington, has furnished sufficient eggs to bring the stock up to 300.

Quail have done exceptionally well. By the first of September the young birds reared will be mature.

Little was expected from the two pairs of Hungarian partridges, yet the one mated female laid seventeen eggs and a few birds were hatched.

birds imported from China three years ago. It is therefore pure stock.

Department of Patrol.

Following the civil service examinations given this past spring, an eligible list has



FIG. 28. Superintendent Bade, State Game Farm, Yountville, California, placing ring-necked pheasant eggs in nest for hatching by hens.

Several varieties of pheasants are now on display at the Game Farm. Included are ring-necked, Mongolian, golden, silver, Reeves and Lade Amherst. Young of both the golden and silver have been hatched.

The stock of ring-necked pheasants given by the state of Oregon is that of

now been established from which appointments can be made. What little reorganization that was necessary has been accomplished with little or no disturbance of the actual patrol work.

J. H. Sanders, a thoroughly competent officer, who for a number of years has been in the employ of the commission, has been appointed captain of the district

comprising Lassen, Plumas, Sierra, upper Nevada, Placer and El Dorado counties.

Chief of patrol, J. S. Hunter, traveled nearly 3000 miles in organizing and supervising the work of deputies during the month of May.

COMMISSION EMPLOYEES SAVE TROUT.

Numerous storms in San Bernardino County caused Big Bear Lake to rise rapidly the past spring. The traps were all in place and good takes of fish were resulting when this high water imperiled the fish in the traps as well as the 4,000,000 eggs incubated in the North Creek Hatchery. Deputies Ed Ricketts and R. J. Little worked with the superintendent of the hatchery for four days and nights in rain, snow, and sleet and finally saved most of the fish and all of the eggs. The traps had to be relogged higher up, and when the water went down in the tributary streams, thousands of fish were left stranded and had to be rescued. The run of fish into the streams during this high water was unusually large, as was also the average size of the fish—four pounds. Had it not been for the faithful service of these employees, a heavy loss would have resulted.

During June, 62 arrests were made and fines totalling \$3,610 were collected. Deputy Johnson, of Napa, arrested a spotlight deer shooter and the defendant spent several weeks prior to his trial in the Napa County jail in default of \$500 cash bail.

Included in the June seizures were: 50 pounds venison, 279 trout, 300 pounds barracuda, 144 dozen crabs, 86 abalones, and 6 cottontails.

State Lion Hunter.

During the first six months of this year, Jay Bruce, state lion hunter, killed 12 lions. Sick dogs have handicapped him for several weeks, but by the end of the year he expects to kill sufficient lions to bring his average up to the usual number of 32 or 33. Mr. Manly Harris of the Motor Body Corporation is much interested in Bruce's work and has very generously presented him with a new machine. It has a special built camping body and is equipped with a Ford motor, and gears which will enable it to go anywhere in the mountainous districts of the state.

COMMERCIAL FISHERY NOTES.

N. B. SCOFIELD, Editor.

It is the opinion of William F. Herrington, assistant fisheries biologist of the State Fish and Game Commission, that the valuable Pismo clam fishery of San Luis Obispo County, instead of being in a very prosperous condition, as is the belief of most of the people in the Pismo beach region, is, in fact, well on the road to extermination. The article in this number of CALIFORNIA FISH AND GAME by Mr. Herrington describes how for years a census of the clam population on the San Luis Obispo beaches has been taken by members of the staff of the California State Fisheries Laboratory at San Pedro. These studies have disclosed the fact that the year 1919 was an extraordinarily successful spawning year for the clams. The clams of that year class made up 90 per cent of all the clams found on the beach up until the year 1923, when they constituted 82 per cent of the total population. In 1924 this percentage dropped to 58 per cent and in 1925 dropped to 7 per cent. In other words, the 1919 year class has

passed out with no other abundant year class to take its place. The year class of 1924, or those hatched in 1924, are only one-tenth as abundant as were the clams of the 1919 year class. As this 1924 crop will not reach the legal size for two or three more years and will then be relatively small in number, the Pismo clam fisheries face extermination unless drastic action is taken.

Herrington shows that the decrease in the number of clams on the beaches is not due to the activity of the commercial diggers, who can market only legal sized clams, but is almost entirely due to the activity of tourists and amateur diggers. During the three years 1923-1925 the census shows that the number of clams in one mile of beach was reduced by over 4,500,000 clams while during the same period the commercial diggers took less than 550,000 clams from all the beaches.

As the legal sized clams have about disappeared tourists and amateurs will be more inclined to take the clams which

have not yet reached the spawning age, and unless some better method of protecting the immature clams can be devised than has been possible in the past, the clams of San Luis Obispo County will, indeed, be virtually exterminated as were the clams on Long Beach, Anaheim Beach and other beaches where they were once abundant.

A QUESTIONNAIRE ON SALMON.

The following is an example of some of the questions that are received by our Commercial Fisheries Department for their attention. These questions are on salmon, of which there are five species found on the Pacific coast, and of these only two are common in California, the king salmon, variously known as the chinook, quinnat, or spring salmon; and the silver salmon, known also as coho and hookbill. The female silver salmon in the Eel River has sometimes been erroneously called blueback. This latter name is commonly applied to the sock-eye, a red salmon of the north.

Thinking the answers to these questions may be of some interest we are printing them below:

1. How long do king salmon remain in fresh water after they are hatched, and on what do they feed?

The young of the king salmon migrate to the sea during the spring, shortly after they are hatched. A number of them remain over until the next winter before migrating, feeding on insects which drop in and float on the surface.

2. What are the enemies of salmon?

The enemies of the young in fresh water are numerous. Trout and other predaceous fishes; birds, like the heron and water ouzel; snakes, etc., are some of them. The adults while they are in fresh water have few enemies other than man. Bears sometimes catch salmon as they pass over shallow riffles in their spawning migration. The enemies of salmon in the sea are thought to be the sea lions and birds like the murre and shag, but there is little evidence on the subject.

3. What causes the salmon to return to fresh water?

It is believed that salmon return and spawn in fresh water to get the young away from the more numerous enemies in the sea. It may be that salmon were originally strictly fresh water fish that have learned to extend their feeding grounds by going out into the sea. The fact that salmon eggs are killed by sea water might be used as an argument that the latter has happened. The salmon are guided by an instinct to enter

or to leave the fresh water. The salmon, it has been pretty well proven, most all return to the parent stream.

4. What is the value of the Pacific coast salmon caught in one year?

The value, to the fishermen, of the salmon caught each year in California, Oregon, and Washington is about \$4,000,000. The California catch is about one-fifth of that.

5. How high a waterfall will a salmon climb?

A king salmon, if it has a deep pool to leap from, can make a clear jump of from 12 to 15 feet in height. After making a good jump it may enter the fall several feet below its crest and be able to swim on up.

6. Do salmon always descend a river tail first?

They supposedly keep their heads to the current.

7. Do all salmon die soon after spawning?

It is believed they do.

8. When salmon are caught on a hook in the river, do they strike the hook in the spirit of combat?

Yes.

9. How can you tell the age of a fish?

By size of rings of growth on scales when viewed under a microscope.

10. What advantage is there to the salmon to spawn far up the river?

The advantage in spawning far up a river is to get the eggs and young above flood conditions and to give the young a longer time in the stream before they are washed out into the ocean. The eggs, if deposited in the gravel too far down stream, may be washed out or covered and killed by flood conditions. The young are not so apt to be washed down stream and the water will not be so muddy, thus enabling the fish to see their food. Muddy water causes them to drift with the current.

CASTING NETS.

Inquiries concerning casting nets are not infrequently received. From the questions asked it is inferred that little is known of the construction or operation of these nets.

A casting net is seldom used in California and never as a commercial proposition. It is used in the Hawaiian Islands and the well known photograph of a Hawaiian fisherman shows him about to make a throw with the net. It takes a good deal of skill to cast one of these small nets which is apparently more of a sporting proposition than anything else. The editor does not remember having

seen more than three of the nets. One was being used by a Japanese who was casting from a boat in the shallow water of the lower San Joaquin River for split-tails and carp. One of the Duarte brothers at Monterey had one of these nets hung on his ceiling as an ornament, and an old German shoemaker of San Francisco had one which he desired to use in Clear Lake for carp.

One of the publications of the Bureau of Fisheries has an excellent description of how the net is operated, but it is difficult to explain to a person who has not seen the net. The net is shaped something like a parachute, the edge is weighted with small weights and from the edge of the net there are small ropes

attached, each one of them so arranged that it will purse or draw up a part of the circumference of the net. These ropes then pass up through a small ring at the center of the net just as you might take the ropes on a parachute and pass them up through a hole in the top. The ropes practically fill the opening so that fish can not pass out. The net is cast with a circular motion so that it spreads out and lands like a blanket on the water. The weighted edges fall to the bottom first, then when the small ropes are pulled through the opening at the top of the net by one central line held in the hand, the edge of the net is pursed and pulled toward the center thus impounding the fish.

LIFE HISTORY NOTES.

BARBED WIRE FENCE CAUSES DEATH OF DEER.

Mr. William Lippincott, deputy fish and game warden, who secured and sent in the photograph reproduced here, writes that the deer is a four-point buck which

According to Mr. Lippincott, this is a common occurrence and causes the death of many deer in his region. The writer's own observations of mule deer on the Kaibab Plateau of Arizona indicate that, of the several ways in which deer are



FIG. 29. Four-point buck, Rocky Mountain mule deer, being removed from barbed wire fence in which it is caught, Yegg, Siskiyou County, California. March 28, 1926. Photograph by M. A. Rapalli.

lived only one or two days after being taken from the fence. He states that the antlers were knocked off in the deer's struggle to free itself and that in the photograph they can be seen lying on the ground.

injured and killed by accident, being caught in wire fences is a common one. The writer remembers particularly one doe, caught in the same manner as the buck shown in the accompanying photograph, that had evidently died from loss

of blood. This resulted from the numerous cuts on various parts of the body sustained in her attempts to get free from the barbed wire. In another instance a fawn, only a few weeks old, was found dead, hanging by one leg that was caught between two parallel limbs over which it, apparently, had tried to jump. The bounding gait and habit of jumping over, rather than going around, objects in its path would seemingly render this animal more subject to accidents of this kind than are other mammals. However, at least the mule deer, as determined from observation, especially when not frightened, goes under or through rather than over barbed wire fences.—E. Raymond Hall.

FORAGE HABITS OF POCKET GOPHER.

Near noon of June 6, 1926, after sitting motionless for a time in a shady spot in the Berkeley Hills, my attention was caught by a slight rustling in the grass near at hand. Turning, I was barely in time to see a California pocket gopher (*Thomomys bottae bottae*) retreat, backward, down a new burrow he had just broken through to the surface. Soon he reappeared, this time shoving a load of dirt ahead of him. After pushing out the third and last load he paused and cut, with his sharp incisors, one of the green, seed-bearing grass stems that grew to a height of seven or eight inches about the hole he had just made. While on his trip below ground with this grass stem I squirmed forward until my eyes were less than twenty-four inches from him when he next came to the mouth of the burrow. While I lay watching he made seven more trips to the surface. Each time he took one and only one stem of the grass. He secured each by turning his head a little to one side and cutting the stem, at a single bite, about one-half inch above the ground. Retreating backward, a short distance down the hole, he would drag a stem after him. One could then hear from four to eight clicks of his teeth as he, presumably, cut the plant into lengths appropriate for his use. Whether he stored these pieces in his cheek pouches as he cut them or left them in the burrow I could not tell. In each case it was only an instant after the clicks of his teeth ceased until he was back at the surface. Although he never came entirely out of the sloping burrow, he reached out on three sides of the opening to secure the grass stems, and in so doing sometimes exposed more than half the length of his body. Several times he

looked directly at me, but failed to recognize me as a possible danger at which to take alarm, although he did appear to be on the watch for enemies.

On the eighth trip to the surface, just after he had cut off another grass stem, the breeze shifted and blew directly toward him from me. The gopher at once became suspicious. Turning in my direction he wiggled his nose pad to test the breeze and, deciding that it was unsafe to longer expose himself, hastily retreated below ground. Thus it would appear that the gopher's sense of smell is of no little aid to him in avoiding certain enemies. Certainly, in the case cited above, it was of more use than his sense of sight.

In less than a minute after his final disappearance he returned along the burrow pushing a load of loose dirt in front of him. This only partly filled the mouth of the hole. A second load completely closed the opening and a third made it fairly solid. Several minutes later I dug out the rather firmly packed soil he had placed in the hole and found that it extended six or seven inches down the burrow. Thus, I inferred that, in all, he had used more than three loads to construct his barricade.

In addition to the method of foraging described above, at least two other general methods of feeding on plants without the gopher exposing himself above ground are resorted to. One is, of course, eating, *in situ*, the tubers, roots, and parts of plants that normally grow underground. The third method, as observed in Shaw's pocket gopher (*Geomys bursarius*) by some students is that of tunneling beneath a plant, then pulling on the roots and dragging the whole below ground.—E. Raymond Hall.

RETURN ON BANDED GOOSE.

Through inquiry of Mr. George Thompson we learn that a cackling goose bearing band No. 302067 was killed by George Kluber on the Browning Ranch six miles west of Biggs, Butte County, California, October 25, 1924. The goose was banded July 31, 1924, less than three months before, at Kashunuk, Alaska, by Mr. O. J. Murie of the United States Bureau of Biological Survey.

BEAVER IN MODOC COUNTY.

The only representatives of the Rocky Mountain type of beaver found in the state are in Modoc County. There are some five different localities near the head of Pit River where beaver are still to be found. Should protection be removed

from these animals California would soon lose a few examples of the famous northern beaver of which she should be proud.

DESTRUCTION OF GOLDEN EAGLE IN CALIFORNIA.

The alarming decrease in numbers of the golden eagle, *Aquila chrysaetos*, in southern California is being noticed even by casual observers.

We have seen our California condor almost exterminated and at the present rate of destruction our golden eagle will be as scarce in a few years. I saw more California condors during a single day of the year 1913 in Santa Barbara County, than I have of the golden eagle in southern California dur-

ing the first three months of the present year. During this first quarter of the year I have not only visited seven former nesting sites (only one being used), but have been in close proximity to others, and in country where they should be, and were formerly, numerous.

My opinion, based on evidence I have seen and on hearsay, is that most of the birds are accidentally caught in traps set for fox, etc. A few are shot by hunters.

Study should be made of trapping methods with a view of finding some methods which can be used without taking toll on our golden eagle. Publicity should be given to the matter and we should do all possible to see that our fast-vanishing golden eagle is protected.—Wilson C. Hanna, Colton, Cal.

CONSERVATION IN OTHER STATES.

ARKANSAS STILL HAS NO PROTECTION ON FISH.

In the April number of the *Arkansas Conservationist* several interesting observations are presented regarding the effects of lack of fish legislation in that state. Only a few years ago this state was far famed throughout the middle west for its excellent fishing. Now most of the streams are depleted. In an article by the editor of the magazine, Dr. H. S. Davis of the U. S. Bureau of Fisheries is quoted as follows:

"How can the people of Arkansas expect game fish to flourish in their streams when there are practically no restrictions on fishing, and any man can catch as many fish as he is able, at any time of the year, and in any manner he may choose to employ?

"It is true there is a law against dynamiting, but it appears that a limited force of game wardens makes enforcement impossible. This is the only restriction on fishing which the state has attempted. The people should realize that no matter how favorable the conditions, no species of fish can maintain itself unless sufficient numbers survive to perpetuate the species. Under present conditions in Arkansas, it is a very exceptional and lucky fish which is able to survive and propagate its kind. With all sorts of methods being used to capture fish, both large and small, the chance of any game fish reaching maturity is slight indeed."

In this same number we learn also that granting of police power to a warden rests entirely with the county sheriff of which

county the game warden is a resident. In some counties, due to the hostile attitude of the sheriffs, game wardens actually are without police power.

By reason of the large amount of rugged mountainous territory in Arkansas that is not adapted to agriculture, game, as well as fish, is more plentiful than in most of the adjoining states. With the construction of good roads, sportsmen, and more particularly anglers, invade it from all sides. Under the present lack of restriction, depletion is progressing at a rapid rate. Arkansas, like many of the western states, also has its problems, resulting from reclamation projects. Large numbers of water fowl winter there, and at the present rate that artificial drainage is being carried on will soon be forced out with consequent overcrowding in other places, resulting as Dr. E. W. Nelson has recently shown, in death from disease. Their problems thus are of interstate nature and the Arkansas Game and Fish Commission and the few earnest individuals in that state who are actually working for better conditions there obviously have a hard row to hoe.—E. R. H.

MISSOURI INTRODUCES GAME.

From *Missouri Game and Fish News* (Vol. 1, No. 2, p. 7) we learn that:

"The department is pleased to report to the sportsmen of Missouri that 50 Virginia (white tail) deer have been imported to this state from Michigan at a cost of \$2,500 and have been released in game refuges located in the Ellington State Park in Reynolds County and in

the Salem refuge in Dent County. The deer were brought here at a cost of \$40 each plus transportation cost of \$10 each, a total of \$50 per deer.

"With a view to better propagation the department purchased the deer on a basis of one buck to two does. At the present time there are eight bucks and seventeen does at the Salem park and eight bucks and seventeen does at Ellington.* All of the animals arrived at the parks in excellent condition."

On page 10 of the same publication we learn that native stock in some parts of the state is sufficiently abundant to be introduced into other parts of the state. Missouri has a closed season on deer until 1930. This fact together with—what is more important—the increasing number of game preserves throughout the state may be expected to cause an increase in the number of white-tailed deer of the area where early settlers found the animals in countless numbers.

NEW METHOD OF PREDATORY MAMMAL CONTROL.

What appears to be an innovation in predatory mammal control has been adopted by the Missouri Game and Fish Commission. From the June number of *Missouri Game and Fish News* we learn that complaint has been made against the presence of foxes in game preserves, and that it has been deemed proper to remove these mammals from said preserves. However, by reason of the large number of devotees that fox hunting, as a sport, has in Missouri, it has been decided that the foxes shall not be killed but shall be captured alive and removed to other areas. Since the preserves in question are said to be surrounded by a single strand of wire we are led to wonder how the foxes will be kept out. The fact, known to biological scientists, that a given area, of limited size, adapted to the needs of a particular species is soon restocked by that species after its sudden depletion, other conditions remaining the same, indicates what may be expected to happen with respect to the foxes. However questionable control measures of this kind are, they are certainly not the potential danger to the public welfare that promiscuous lethal measures are.—E. R. H.

STEELHEAD IS GAME FISH IN WASHINGTON.

The steelhead is a game fish when found above the mouth of any river flowing into salt water in the state of Washington, according to the opinion of Assist-

ant Attorney General E. W. Anderson of that state. Some point on each river will be designated as the mouth of the stream.

This law passed at the recent special session of the Washington state legislature will make it necessary that fishermen catching these fish above the river mouth must have a game fish license and must observe the bag limits provided for game fish.—*The Oregon Sportsman*.

OIL POLLUTION.

From the thirty-fifth annual report of the Royal Society for the Protection of Birds, we learn that the society has taken active steps to do away with oil pollution of certain waters in the British Isles. We also learn that a motion was made during one of their meetings to arouse, if possible, public opinion in America on this question as they believe that "there was not really any lack of good will; for there (in America) they cared very much more about the subject."

California can well be congratulated upon its early activities in this matter since the newly organized Bureau of Pollution of the California Fish and Game Commission is designed to handle cases of this kind. Many cases have already been investigated by this bureau and often satisfactory arrangements have been made without taking the cases into court. Although cases handled in this way gain but slight recognition, their number is one measure of the bureau's success, for the expense saved the commission in not having to invoke the law, and the injury to aquatic life that is forestalled by immediate action, is great.—E. R. H.

NEVADA GAME REFUGE.

The governor of Nevada has recently proclaimed the establishment of a game refuge, 12 by 14 miles in extent, along the Idaho-Nevada state line, to be known as the Elko County Goose Creek State Recreation Ground and Game Refuge. This joins the Minidoka National Forest in Idaho, in that portion of which hunting is forbidden.—*The Oregon Sportsman*.

BIRD PROTECTION IN SWITZERLAND.

From the summary published in the March (1926) number of *Nos Oiseaux*, the organ of the Swiss Society for the Study and Protection of Birds, it appears that the new Federal Bird Protection Act of 1925 divides wild birds into two classes, (a) those which may be killed

in the open season by persons having permits, and (b) those which are to be protected all the year.

By virtue of these two articles in the law, remarks *Nos Oiseaux*, "all the little insectivorous and granivorous birds are protected, except the thrush, the fieldfare, and the sparrow," clause (b) comprising all species not mentioned in the first clause, whether resident, breeding, birds of passage, winter visitors, or casual visitors. The list of those only partially protected and regarded as "game," includes, not only such birds as pheasants, partridges, grouse, quail, etc., but also wild pigeons (except turtledove) and wild ducks, wild geese, woodcock, snipe, divers, grebes, rails, coot, moorhen, cormorant, golden eagle, goshawk, peregrine falcon, sparrowhawk, hobby, crow, hooded crow, rook, raven, magpie, jay, nuthatch (cassenoix), sparrow, thrush, and fieldfare.

All owls, buzzards, bitterns, and herons are among the protected, and also all the waders (except those specified), including redshank, sandpipers and plovers.

Although the golden eagle may be killed in the shooting season, it is rigidly protected at its eyrie, and any person taking or acquiring or selling the eggs or young birds is subject to a heavy fine.

The confederation encourage by subsidies measures taken by the cantons for creating reserves, protecting woods and reed beds, provision of nesting boxes and food, etc.; and in concert with the forestry administration will facilitate the nesting of protected birds and the conservation of the trees they favor. The cantons have liberty to extend the measures of the law in various ways, such as lengthening the close time; forbidding battues, the use of motor boats for taking water birds, and Sunday and night shooting; adding to the list of fully protected species, etc.; information to be given to the federal council when such measures are adopted.

School children are to be taught to distinguish the protected birds, to know their utility and the duty of noninterference with them.—*Bird Notes and News*, Vol. 12, No. 1, p. 6.

REPORTS.

GAME CASES.

January-February-March, 1926.

	Number Arrests	Fines Imposed	Jail Sentences (days)
Violations of Hunting License Act.....	24	\$340 00	-----
Violations of Fur Trapping Regulations.....	5	80 00	-----
Deer: hunting, killing, possession; closed season.....	21	1,405 00	75
Deer: killing, possession; does, fawns, spike bucks.....	1	50 00	-----
Deer: skins, evidence of sex removed.....	1	25 00	-----
Ducks: over bag limit.....	2	90 00	-----
Ducks: killing, possession; closed season.....	8	250 00	-----
Mudhens: killing, possession; closed season.....	6	100 00	-----
Geese: over bag limit.....	2	75 00	-----
Geese: killing, possession; closed season.....	2	50 00	-----
Swans: killing, possession.....	4	115 00	-----
Shorebirds: killing, possession.....	1	-----	-----
Quail: killing, possession; closed season.....	3	125 00	-----
Pheasants: killing, possession.....	7	525 00	25
Nongame birds: killing, possession.....	17	620 00	20
Rabbits: cottontail-brush; killing, possession, closed season.....	15	600 00	-----
Squirrels: (tree) killing, possession.....	2	175 00	-----
Shooting from automobile—power boat.....	8	165 00	-----
Night hunting.....	19	325 00	-----
Totals.....	148	\$5,115 00	120

FISH CASES.

January-February-March, 1926.

	Number Arrests	Fines Imposed	Jail Sentences (days)
Violations of Angling License Act.....	11	\$225 00	-----
Violations of Commercial Fishing License Act.....	2	20 00	-----
Trout: closed season.....	11	415 00	-----
Trout: illegal spearing.....	2	50 00	-----
Crappie: closed season.....	1	-----	20
Striped bass: undersized; over bag limit.....	16	800 00	-----
Striped bass: shipment out of state.....	2	25 00	10
Crabs: transporting out of district 1½.....	1	40 00	-----
Clams: undersized; over bag limit.....	24	475 00	20
Abalones: closed season.....	21	580 00	-----
Abalones: undersized.....	24	610 00	-----
Lobsters: undersized.....	7	245 00	-----
Salmon: over bag limit.....	1	50 00	-----
Smelt: young of.....	1	20 00	-----
Illegal fishing: 250 feet of a fishway; 150 feet of a dam.....	2	20 00	-----
Illegal fishing: fish reservation.....	4	170 00	-----
Nets: illegal possession or use.....	14	1,850 00	-----
Totals.....	144	\$5,595 00	50

SEIZURES OF FISH AND GAME.

January-February-March, 1926.

GAME		FISH	
Quail.....	4	Trout.....	102
Pheasant.....	2	Striped bass.....	433
Nongame birds.....	19	Pismo clams.....	85
Deer meat, pounds.....	690½	Crabs.....	1,004
Rabbits.....	31	Crab meat, pounds.....	2
Ducks.....	439	Abalone.....	493
Geese.....	45	Salmon, pounds.....	280
Robins.....	11	Lobsters.....	224
Deer hides.....	1	Nets.....	1
Mud hens.....	3	Smelt, pounds.....	35
Sea gulls.....	2	Sliced abalone, pounds.....	85
Swan.....	3	Shiners.....	2
Gray fox skin.....	1	Flounders.....	20
Squirrel.....	2	Crappie.....	1
Coyote furs.....	10	Pike.....	13
Skunk furs.....	1	Sandabs, pounds.....	4
Pigeons.....	2	Mackerel, pounds.....	5
Shore birds.....	4	Cans of trout.....	1
Mountain sheep head.....	1		

STATEMENT OF INCOME.

For the period January 1, 1926 to March 31, 1926.

License sales:	Detail	Total
Angling.....	\$34,896 00	
Hunting.....	58,846 00	
Market fishermen's.....	4,220 00	
Trapping.....	607 00	
Wholesale fish packers' and shell fish dealers'.....	45 00	
Game breeders.....	265 00	
Fish breeders.....	60 00	
Kelp.....	10 00	
Total license sales.....		\$98,949 00
Other income:		
Court fines.....	\$10,060 00	
Fish packers' tax.....	18,219 20	
Kelp tax.....	60	
Fish tag sales.....	1,177 90	
Game tag sales.....	1 92	
Sale of beaver hides.....	-----	
Sale of nets, line and other equipment.....	180 00	
Abalone inspection.....	6 28	
Interest on bank deposits.....	499 22	
Total other income.....		30,145 12
Total income.....		\$129,094 12

STATEMENT OF EXPENDITURES.

For the Period January 1, 1926 to March 31, 1926 of the Seventy-seventh Fiscal Year.

Function	Materials and Supplies	Salaries and Wages	Service and Expense	Property and Equipment	Total
Administration:					
Commissioners			\$171 06	\$67 45	\$238 51
Executive and legal	\$27 70	\$1,665 81	343 23	3 14	2,039 88
Clerical and office	337 74	5,098 38	786 52	486 44	6,709 08
Rent			3,049 46		3,049 46
Printing	277 65				277 65
Postage			936 31		936 31
Freight, cartage and express			277 32		277 32
Telephone and telegraph			884 54		884 54
Automobiles	21 19		21 95	1,651 89	1,695 03
Total administration	\$664 28	\$6,764 19	\$6,470 39	\$2,208 92	\$16,107 78
Publicity and research:					
Director of education and research	\$13 08	\$275 00	\$121 84	\$5 70	\$415 62
Director of publicity and pollution	13 40	1,374 37	172 61	4 75	1,565 13
Printing	4 40				4 40
Total publicity and research	\$30 88	\$1,649 37	\$294 45	\$10 45	\$1,985 15
Conservation and protection:					
(Patrol and law enforcement)					
Chief and assistant		\$1,123 26	\$149 92		\$1,273 18
Captains and deputies	\$54 80	32,035 06	21,959 23		54,049 09
Patrol launches	160 89	310 00	92 81	\$116 50	680 20
Clerical and office	49 90	1,090 00	5 00		1,144 90
Rent			163 60		163 60
Automobiles	87 76		110 90	17 05	215 71
(Protection)					
Lion hunter		375 00	44 72		419 72
Lion bounties			2,140 00		2,140 00
Total conservation and protection	\$353 35	\$34,933 32	\$24,666 18	\$133 55	\$60,086 40
Commercial fisheries:					
Chief and assistants	\$78 83	\$1,573 32	\$116 36	\$2 97	\$1,771 48
Deputies	38 16	7,450 06	1,357 33	66	8,846 21
Laboratory research	53 12	4,605 00	330 39	151 65	5,140 16
Statistical	6 32	1,000 00	45 01	99	1,052 32
Patrol launches	694 91	660 00	216 27		1,571 18
Salmon tagging			1 00		1 00
Total commercial fisheries	\$871 34	\$15,288 38	\$2,066 36	\$156 27	\$18,382 35
Game propagation:					
Game farm maintenance and operation	\$1,305 24	\$1,205 81	\$684 56	\$1,234 76	\$4,430 37
Additions and betterments				18,742 31	18,742 31
Total game propagation	\$1,305 24	\$1,205 81	\$684 56	\$19,977 07	\$23,172 68
Fish culture:					
Chief of division		\$933 32	\$63 80		\$997 12
Special field investigation	\$111 35	2,090 65	313 63	\$27 85	2,543 48
Clerical and office	31 87	1,175 00	13 10		1,219 97
Printing	88 95				88 95
Hatcheries	6,994 51	15,443 61	1,546 33	435 73	24,420 18
Automobiles	304 62		173 21	959 50	1,437 33
Rent			212 40		212 40
Total fish culture	\$7,531 30	\$19,642 58	\$2,322 47	\$1,423 08	\$30,919 43
License commissions			\$11,261 60		\$11,261 60
Total expenditures	\$10,756 39	\$79,483 65	\$47,766 01	\$23,909 34	\$161,915 39

Species of Fish	Del Norte, Humboldt.....	Mendocino, Sonoma, Lake...	Marin.....	Solano, Yolo.....	Sacramento, San Joaquin.....	Alameda, Contra Costa...	San Francisco, San Mateo.....	Santa Cruz.....	Monterey.....	San Luis Obispo, Santa Barbara, Ventura.....	Los Angeles.....	Orange.....	San Diego, Imperial.....	Total.....	Mexican, brought into California via San Pedro....	Mexican, brought into California via San Diego....	Total Mexican brought into California.....
Albacore.....											9,935			9,935			
Anchovies.....																	
Barracuda.....											5,779	201	109,377	167,546	70,163		513,036
Bluefish.....																	
Bocaccio.....																	
Bonito.....																	
Carp.....							302		11,105	1,246	9,886	509	9,625	32,371	11,597		19,527
Catfish.....							103,539	4,600	18,490	12	467	383		42,717			
Chillipepper.....														101,658			
Cultus Cod.....														128,329			
Dolphin.....																	
Eels.....							5						63	68			
Flounders.....	1,9710	270	30	30		316	96,703	7,956	8		232		42	125,297	22		22
Grayfish.....							133,401		11,287		10,373		45,117	200,178			
Greenfish.....																	
Hake.....							10,002	123						10,002			
Halibut.....							1,498		475	45,283	286,705	35,591	116,813	486,498	4,574	40,957	45,531
Hardhead.....																	
Herring.....	6,175		1,935			725	360,490			290			1,825	22,378			
Kingfish.....									17,050		134,193	537	1,600	371,440		125	125
Mackerel.....	378							175	421,684	2,783	405,030	61,545	238,226	1,129,821			
Mackerel, —Horse.....									262		5,827	391		6,480			
Mullet.....									3,443	48	17,317			20,808	12,903		315
Perch.....	8,650		26,011			159	13,866	750	1,830	506	14,991	110		66,873	336	927	1,263
Pike.....						978								1,426			
Pompano.....				38	410						4,697		40	4,737			
Rock Bass.....																	
Rockfish.....							180,019	241,082	407,899	17,590	34,948	12,285	21,521	68,754	390	24,181	24,571
Sablefish.....	1,018	12,595					41,426	5,015			1,005,075	13,687	585,290	2,464,255		11,133	11,133
Salmon.....							4,490		340	12	2,461			49,254			
Salmon.....				5,325	22,978	18,880	358,283	6,500	138		3,974	147		381,982			
Sardines.....		12,940					522,980		57,824,995		85,522,681	710	10,604,406	153,875,672			
Sculpin.....																	
Sea Bass—Black.....																	
Sea Bass—White.....																	
Sea Trout.....																	
Shad.....				374	726	6,062	62							7,224			
Shad—Buck.....				17,120	4,870	71,289								93,279			
Shad—Roe.....				20,279	3,867	106,458								130,604			
Sheepshead.....																	
Snakes.....							63,003	750		201	20,671	20	3,802	24,694	200		200
											13,333	15	10,905	88,006			

Skipjack.....	11,613	66,670	7,408	---	---	---	404	23,756	34	462	---	1,121	360	---	4,399	1,943	---	47,714	47,714
Snelt.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	210	210
Sole.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Spittail.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Striped Bass.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Sungaree.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Suckers.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Surf Fish.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Swordfish.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Tomcod.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Trout—Farm.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Trout—Steelhead.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Tuna.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Tuna—Bluefin.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Tuna—Yellowfin.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Turbot.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Whitebait.....	2,944	---	159	---	---	---	105	---	---	---	---	---	---	---	---	---	---	---	---
Whitefish.....	---	---	4,166	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Yellowtail.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Miscellaneous.....	409	16,061	---	---	---	---	115	1,502	---	1,491	4,609	22,450	2,148	---	75,777	151	137,262	188,516	20,575
Total fish.....	51,460	211,901	40,675	75,957	133,636	447,602	321,481	58,723,673	118,192	87,886,280	147,326	11,305,740	163,376,249	773,516	1,051,574	1,825,090	---	---	---
Crustaceans.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Crabs.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Ecrevisse.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Shrimps.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Spiny Lobsters.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mollusks.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Abalones.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Clams—Cockle.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Clams—Mixed.....	5,195	584	11,973	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Clams—Pismo.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Clams—Softshell.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Cuttlefish.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Limpets.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mussels.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Oysters—Eastern.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Oysters—Native.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Snails.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Squid.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Miscellaneous.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Frogs (doz.).....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Terapins (doz.).....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Turtles.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Totals.....	125,319	213,925	187,885	75,957	133,636	477,375	5,386,366	353,806	58,886,074	186,091	87,917,873	151,400	11,350,618	165,446,325	802,019	1,319,027	2,121,046	---	---

All amounts shown in pounds unless otherwise specified. Albacore and skipjack cleaned.

All other fish in round.

1,286,111 dozen
 3,606 dozen
 3,316 dozen
 4,80,729 dozen

463.33 8-26 7500

5,682,250 shell oysters
 6,118,220 shell oysters
 7,113 dozen
 5,55,261 dozen

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